FURUNO

OPERATOR'S MANUAL

COLOR GPS PLOTTER GP-3100
COLOR VIDEO PLOTTER GD-3100

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Table of Contents

Table of Contents by Function vii
Your Table of Contents viii

Foreword ix

Features x
How to Use this Manual xi

Getting Acquainted With Your Unit 1

BASIC OPERATION 1-1

Typographic Conventions 1-2
Control Description 1-3
Turning the Power On and Off 1-5
  Turning the power on 1-5
  Turning the power off 1-5
The Trackball 1-6
  Function of the trackball 1-6
Operating the Cursor 1-7
  Function of the cursor 1-7
  Turning the cursor on or off 1-7
  Cursor information 1-7
  How to shift the cursor 1-8
Shifting the Display 1-9
  Returning own ship mark to screen center 1-10
  Selecting screen center by cursor position 1-10
Selecting Chart Scale 1-11
Adjusting Display Brilliance and Key Backlighting 1-12
Card Drives and the Factory-Digitized Chart 1-13
  Card drives 1-13
  Displaying an electronic chart 1-13
  Ejecting the chart card 1-14
  Care and handling of the cards 1-14
  Selecting a chart feature as screen center 1-14
  What to do when 1-15
  Chart-related icons 1-15
The Data Window 1-16
  Data shown when cursor is on 1-16
  Data shown when cursor is off 1-16
Selecting Display Mode 1-17
  Plot mode 1-17
  Video pilot 1-17
  Nav data 1-17

The Menu 1-18
Menu operation versus key operation 1-18
Selecting a menu 1-18
Operation on the Display 1-19
Selecting item 1-19
Selecting option 1-19
Entering data 1-19
Summary of menu operation 1-19
Turning off Track Recording 1-20
Why turn off track recording? 1-20
Turning off track recording 1-20
What happens during HOLD? 1-21
Restarting track recording 1-21
Marks 1-22
Mark memory 1-22
Entering mark at cursor intersection 1-22
Entering mark at your ship's position 1-22
Changing mark color 1-22
Deleting a mark 1-23
Clearing the Display Screen 1-24
Economy Mode 1-26
Interpreting the Display Icons 1-27
Course Vector and Time Mark 1-28
Course vector 1-28
Time mark 1-28
Sample Plot Displays 1-29
Plot display when cursor is on 1-29
Plot display when cursor is off 1-30

INTERMEDIATE LEVEL OPERATION 2-1

Section 1
Plot Display

Setting the Time and Date 2-3
Changing Track Color 2-4
Deleting Track by Color 2-5
Entering Waypoints 2-6
What is a waypoint? 2-6
Guidelines for entry of waypoint 2-6
Comments for waypoints 2-7
Special waypoints 2-7
Entering a waypoint 2-7
Entering a comment 2-11
Turning Specific Waypoint Display On or Off 2-12
Turning off 2-12
Turning on 2-13
Deleting Waypoints 2-14
By cursor 2-14
By waypoint list 2-14
Deleting external waypoint 2-14
Destination Waypoint 2-15
What is a destination waypoint? 2-15
Setting a destination waypoint 2-15

After setting a destination waypoint 2-17
Displaying range and bearing to destination waypoint ... 2-17
Cancelling Destination Waypoint 2-18
Through the menu 2-18
By key input 2-18
Alarms 2-19
Arrival alarm 2-19
Anchor watch alarm 2-21
XTE alarm 2-21
Border alarm 2-22
Ship's speed alarm 2-23
Silencing the audible alarm 2-24
What alarm is sounding? 2-24
Lines 2-25
Entering a line 2-25
Deleting points on a line 2-25
Changing line color 2-25
Setting Intermediate and Destination Waypoints 2-26
Saving Data to a Memory Card 2-28
What the memory card can store 2-28
Storage capacity of memory card 2-28
Formatting a memory card 2-28
Saving data 2-29
Playing Back Memory Card 2-32
Changing the Plot Interval 2-33
Plot interval 2-33
How the track is drawn 2-33
Plot interval and track reconstruction 2-33
Plot interval by time or distance 2-33
Setting plot interval 1 by time 2-34
Setting plot interval 2 to "time" 2-34
Displaying Your Ship's Position in Loran TDs 2-35
Loran A TDs 2-35
Loran C TDs 2-36
Changing Bearing Display Method 2-37
True bearing 2-37
Magnetic bearing 2-38
Entering magnetic variation 2-38
Changing Chart Appearance 2-39
Key Operation Tree 2-40

Section 2
Video Pilot &
Navigation Data
Displays

Video Pilot Display 2-42
Features 2-42
Destination data 2-43
Mark data 2-43
Comparison of plot and video pilot displays 2-44
Navigation Data Display 2-45

ADVANCED LEVEL OPERATION 3-1

Route Navigation 3-2
What is a route? 3-2
Route storage capacity 3-2
Creating a route 3-3
Following a route 3-5
About route navigation 3-5
Temporarily deselecting a route waypoint 3-6
Permanently deleting route waypoints 3-7
Cancelling route navigation 3-8
Route color and route status 3-8
Methods of route entry and cancellation 3-8
The External Event Mark 3-9
What is the external event mark? 3-9
Inscribing an event mark on the 3100 3-9
Erasing an external event mark 3-9
Turning off event mark display 3-9
Entering Mark by Latitude and Longitude 3-10
Deleting All Tracks and Marks 3-11
Deleting all track 3-11
Deleting all marks/lines 3-12
Correcting Position 3-13
By cursor 3-13
By latitude and longitude 3-14
By Δ (Delta) L/L 3-14
Cancelling chart position correction 3-15
Loran TD Correction 3-16
Calculating R/B Between Two Points 3-17
By latitude and longitude 3-17
By cursor 3-17
By waypoint numbers 3-18
Route Calculation 3-19
Editing Track and Marks 3-20
Editing facilities 3-20
The edit track/mark menu 3-20
Basic procedure for editing/deleting 3-20
Changing track appearance 3-21
Changing mark shape by box cursor 3-22
Deleting track by box cursor 3-23
Editing the Memory Card 3-24
Adding track, marks/lines 3-24
Deleting track, marks/lines 3-24
Deleting a file 3-24
Customizing the PLOT INTVL Key 3-25
Setup for manually entering plot interval 3-25
Turning off a plot interval 3-25
Customizing the Track Hold Function 3-26
Turning off track display during track hold 3-26
Connecting track after restarting track recording 3-26
Locking Preferred Settings 3-27

Locking or unlocking preferred settings 3-27
Memory Capacity 3-28
Track memory 3-29
Mark/line memory 3-29
Apportioning the Memory 3-30
Reading Number of Memory Points Used 3-31
Track 3-31
Marks/lines 3-31
Smoothing 3-32
Selecting Navaid 3-33
User Definable Items 3-34
Initial settings menu 3-34
Special menu 3-35
Saving and Playing Back Initial Settings 3-37
Saving 3-37
Playing back 3-37
Clearing Memories 3-38
Clearing display screen data 3-38
Clearing GD data 3-38
Clearing GPS data (GP-3100) 3-39
Clearing all data (GP-3100) 3-39

GPS RECEIVER OPERATION (GP-3100) 4-1

How GPS Works 4-2
The GPS system 4-2
How the GPS receiver fixes its position 4-2
Position-fixing accuracy 4-3
Almanac 4-4
GPS Information on the Navigation Data Display 4-5
GPS receiver condition 4-6
Satellite schedule 4-7
Frequency deviation 4-7
Satellite information 4-7
GPS Initial Settings 4-8
Description 4-9
Satellite force health/deselection 4-10
GPS Smoothing 4-11
Latitude and longitude 4-11
Speed and course 4-11
Setting GPS smoothing 4-12
Cold Start 4-13
Geodetic Datum 4-14
Geodetic chart systems 4-14
Standard GPS chart system 4-14
Selecting chart system 4-14
Code number and geodetic chart system 4-15

AUTOPILOT INFORMATION 5-1

Features 5-2
Autopilot Information on Plot Display 5-3
Autopilot Information on Video Pilot Display 5-4
  Information according to autopilot condition 5-4

MAINTENANCE AND TROUBLESHOOTING 6-1

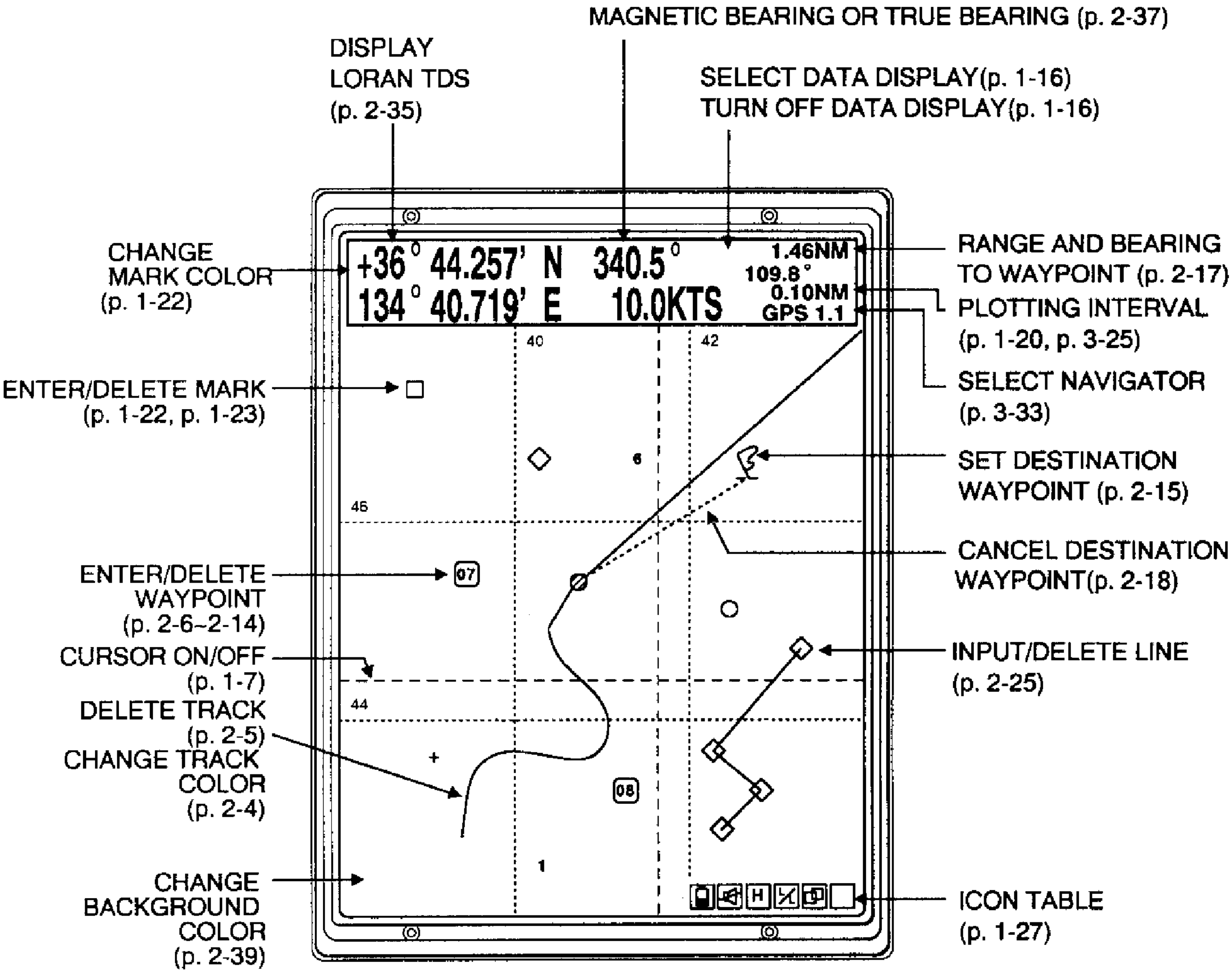
Self Test 6-2
  Self test at power on 6-2
  Self test menu 6-2
Error Messages 6-6
Maintenance and Checking 6-9
  Regular maintenance 6-9
  Demagnetizing the display 6-9
  Replacement of fuse 6-9
  Replacement of batteries 6-10
  Verifying program version no. 6-11
  Replacement of program ROM 6-12
  10 inch color CRT monitor service parts 6-13
Troubleshooting 6-14

Appendix A-1

Specifications A-2
Menu Tree A-4
Menu Description A-5
Default Settings A-7

Index Index-1

Table of Contents by Function



FACTORY-DIGITIZED CHART
(p. 1-13)

Your Table of Contents

Subject	Page

Foreword

FURUNO Electric Company thanks you for considering and purchasing the FURUNO GD-3100/GP-3100. We are confident you will discover why FURUNO has become synonymous with quality and reliability.

For over 40 years FURUNO Electric Company has enjoyed an enviable reputation for efficient and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your unit is designed and manufactured to meet the rigorous demands of the marine environment. However, no machine can perform to the utmost of its ability unless properly operated and maintained. Please carefully read and follow the recommended procedures for operation and maintenance.

We would appreciate hearing from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO.

Features

The GD-3100 and the GP-3100 mostly share the same features. The GP-3100 is additionally equipped with a GPS receiver and a GPS antenna, to receive and process GPS satellite signals.

Navigation data appear on a high-resolution 10 inch CRT. A viewing hood is supplied.

On-screen data include ship's position in latitude and longitude, speed and course, cursor position, range and bearing to cursor, range and bearing to a waypoint.

Both units can be powered by a 12V or 24V DC power supply. 100V, 115V or 220V AC operation is also available by using a rectifier (optional supply).

Features common to both the GD-3100 and the GP-3100 are as follows.

- Alarms: Arrival alarm, Anchor Watch alarm, Cross-track Error alarm, Border alarm
- Built-in memory – 8,000 points of tracks and marks, 99 waypoints, 10 routes with up to 15 waypoints per route
- Comprehensive navigation display of alphanumeric navigation data plus automatic track plotting
- Economy mode reduces power consumption – CRT is turned off while receiver/processor keeps updating data
- Storage for up to 100 waypoints
- Factory-digitized electronic charts stored on ROM cards
- Memory cards for storage of track, waypoints, marks
- Menu-driven operation
- Navigation planning from/to waypoint or routes

How to Use this Manual

This manual is laid out in as "user-friendly" a manner as possible. A sophisticated instrument such as the GD-3100 and the GP-3100 with their many, many functions can be very intimidating to the first-time user. It is our intention to guide the user along in the use of the gear as gently and as comfortably as possible in a series of sections that start a very basic level and proceed forward in complexity in a logical manner.

This manual consists of the following chapters and sections:

Getting acquainted with your unit. This section introduces to a few of the basic functions which you will use in everyday use.

Basic operation. This chapter explains the basics; from turning the power on and off to clearing the display screen.

Intermediate level operation. This chapter consists of two sections: plot display, and video pilot and navigation data displays.

Advanced level operation. You will learn how to create a route, apportion the memory, clear memories, etc.

GPS receiver operation (GP-3100). This chapter covers operation of the GPS receiver. GD-3100 owners can skip over this chapter.

Autopilot information. With autopilot connection (for example, FURUNO FAP-330), you can display autopilot information on the GD-3100/GP-3100. This chapter explains what information is shown with autopilot connection.

Maintenance and troubleshooting. You will learn how to keep your unit in good working order.

Appendix. This section contains specifications, menu tree, menu description and default settings.

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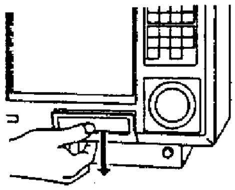
Getting Acquainted With Your Unit

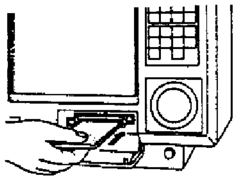
This section lets you take your unit out for a test drive, before getting into the nitty gritties. You will learn a few of the basics – from how to insert an electronic chart card (to display an electronic chart) to turning off the power. The procedure consists of 36 steps and takes no longer than ten minutes to complete. Good luck!

Inserting electronic chart card, turning on the power, operating the cursor, changing chart scale, and shifting the chart

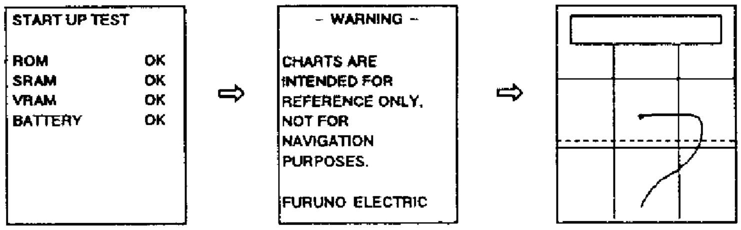
1. Open the card drive cover.



2. Insert the electronic chart card which contains a chart of your sea area into the lower card drive. (Note that the upper card drive is for memory (RAM) cards, which function to store data.)



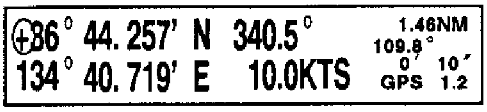
3. Press the power switch on the display unit. You will hear a peep and then the display changes in the sequence shown in the figure which follows.



(SELF TEST) (WARNING) (PLOT DISPLAY)

4. Confirm that the " + " mark appears at the top of the display. The " + " mark means the cursor is displayed. If the mark is not displayed, press the [+/⁄●] key to display it.

CURSOR MARK ☞



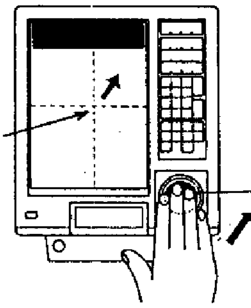
5. Operate the trackball to shift the cursor. As you rotate it look at the indications for cursor position, range and bearing (from your ship) in the data window at the top of the display; they should change with trackball rotation.

CURSOR POSITION

RANGE FROM YOUR SHIP TO CURSOR

BEARING FROM YOUR SHIP TO CURSOR

CURSOR

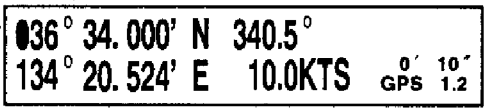


TRACKBALL

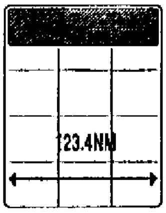
6. Press the [+/⁄●] key. The cursor, " + " mark and cursor information displays disappear. You should now see a filled oval mark and your ship's position in the data window. The filled oval mark denotes own ship mark, which blinks on the display.

SHIP'S POSITION

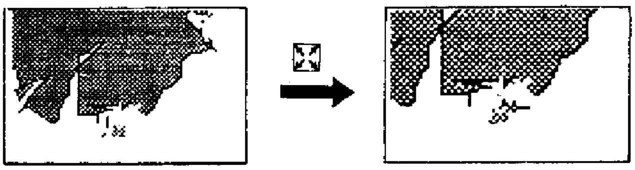
OWN SHIP MARK ☞



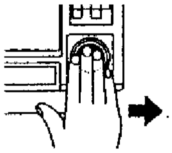
7. Press [zoom key] twice. This key "blows up" the picture. Each time you press the key the new chart scale appears momentarily at the screen center.



8. Press twice. This key shrinks the picture. Each time you press the key the new chart scale appears momentarily at the screen center.



9. Press / to select chart scale desired. If the chart is not displayed, press to try to display it.
10. Rotate the trackball rightward to shift the chart rightward.



11. Shift the chart to position desired by operating the trackball.

Navigating to a destination

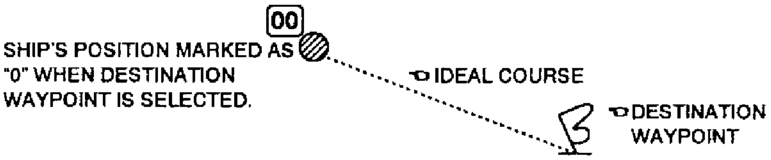
12. Press **FR/TO**. The DESTINATION SETTING menu appears. On the MODE line "CURSOR" should be circumscribed. If it is not, press [↓] to select the MODE line and then press [←] to select CURSOR.

DESTINATION SETTING
▶ DEST = [SET] CANCEL
MODE = [CURSOR] WAYPOINT ROUTE R/B

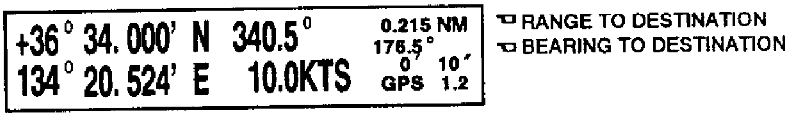
SELECT DESTINATION BY USING CURSOR AND
PRESS ENT.
INTERMEDIATE POINTS CAN BE SET BY USING + KEY.

13. Operate the trackball to select a destination by the cursor.

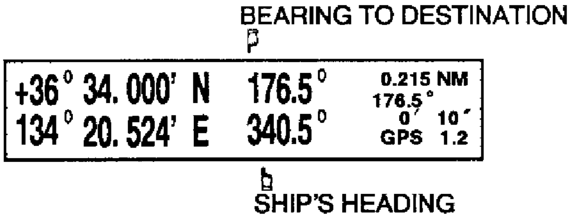
14. Press **ENT**. As shown in the figure below
    - the location selected by the cursor is marked with a yellow flag
    - your ship's location is denoted by "00", and
    - a light-blue dashed line connects your ship's location and the destination waypoint. This line shows the shortest range to the destination.



The range and the bearing from your ship's position to the destination appear at the top of the display.



15. Press the **PLOT** key. The data window shows bearing and course to destination.



16. Press the **PLOT** key once to turn off the data window.
17. Press the **PLOT** key to display the data window.

Once you arrive at your destination you will no longer need the destination flag and the line which shows shortest course to destination. You can erase them as follows.

18. Press **FR/TO**. The DESTINATION SETTING menu appears.

DESTINATION SETTING
▶ DEST = [SET] CANCEL
MODE = [CURSOR] WAYPOINT ROUTE R/B

SELECT DESTINATION BY USING CURSOR AND PRESS ENT.
INTERMEDIATE POINTS CAN BE SET BY USING + KEY.

19. Press [→] to circumscribe "CANCEL" on the second line of the menu.

```
DESTINATION SETTING
▶DEST  = SET  [CANCEL]
 MODE  =[CURSOR]  WAYPOINT  ROUTE  R/B

SELECT DESTINATION BY USING CURSOR AND PRESS
ENT.
INTERMEDIATE POINTS CAN BE SET BY USING + KEY.
```

20. Press **ENT**. The ideal course line, flag and "00" disappear.

You can denote important locations with marks. Try to enter a diamond mark by following the next two steps.

21. Operate the trackball to set cursor on location desired for mark.
22. Press the [◇] key. The diamond mark appears on the location selected.

The color of the " + " mark in the data window is the current mark color. You can change mark color as follows.

23. Press the **MARK COLOR** key. The CHANGE MARK COLOR menu appears.

```
CHANGE MARK COLOR
▶MARK COLOR = [1]  2  3  4  5  6  7

SELECT MARK COLOR BY NUMBER.
```

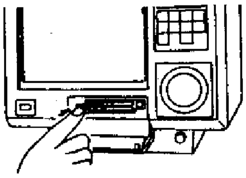
24. Press a numeral key among 1 through 7 to select color. If you want mark color to be yellow, for example, press the **2** key followed by the **ENT** key. (Take a look at the " + " mark in the data window; it should be yellow.)
25. Operate the trackball to select a location for a mark, and then press the [□] key. A yellow square mark is inscribed on the display.

Deleting a mark

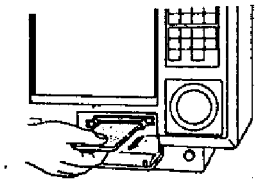
26. Operate the trackball to set the cursor intersection on the diamond mark you entered at step 22.
27. Press the **CLR** key to erase the mark.

Erasing an electronic chart from the display

28. Press the (left side) eject button.



29. Pull the card towards you. Notice that the chart is still displayed.



30. Press . The chart is erased from the display.
31. Insert the electronic chart card once again into the lower card drive. (No chart appears yet.)
32. Press to display the chart.

Changing land color

33. Press the **CHART** key. The GEODETIC DATUM menu appears.

```
         GEODETIC     DATUM       :
CURSOR→  ▶ LAND DENSITY           = 1  2  [3]  4  0 (OFF)
           LAND COLOR             = 1  [2]  3  4  5  6  7
           PLACE-NAME             = [ON]  OFF
           GRID                   = [ON]  OFF
           BACKGROUND COLOR       = 1  2  3  4  5  6  7  [0] (OFF)
           BACKGROUND BRT         = HIGH  [LOW]
```

34. Press [↓] to set the cursor on the LAND COLOR line. You can select color by pressing numeral keys 1 through 7 or selecting color number on the menu. If you want the land color to be yellow, for example, press the **2** key.

```
         GEODETIC     DATUM       :
           LAND DENSITY           = 1  2  [3]  4  0 (OFF)
CURSOR→  ▶ LAND COLOR             = 1  [2]  3  4  5  6  7
           PLACE-NAME             = [ON]  OFF
           GRID                   = [ON]  OFF
           BACKGROUND COLOR       = 1  2  3  4  5  6  7  [0] (OFF)
           BACKGROUND BRT         = HIGH  [LOW]
```

35. Press [→] once to select 3 (green).

```
         GEODETIC     DATUM       :
           LAND DENSITY           = 1  2  [3]  4  0 (OFF)
CURSOR→  ▶ LAND COLOR             = 1  2  [3]  4  5  6  7
           PLACE-NAME             = [ON]  OFF
           GRID                   = [ON]  OFF
           BACKGROUND COLOR       = 1  2  3  4  5  6  7  [0] (OFF)
           BACKGROUND BRT         = HIGH  [LOW]
```

Turning off the unit

36. Press the power switch to turn off the unit.

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BASIC OPERATION

This chapter acquaints you with the basics of your unit – from turning on the power to clearing the display screen of data.

Typographic Conventions

Before you start reading this manual, please familiarize yourself with the typographic conventions we use throughout this manual.

- For sake of brevity, we use the term "3100" when referring to both the GD-3100 and the GP-3100.
- Key names appear in a font different from the body text for emphasis. For example, the MENU key appears as **MENU** key.
- There are some instances where you will press several of the arrow keys ([↑], [↓], [←], [→]) to select items on the display. In this case we use the term "arrow keys", rather than naming specific arrow keys.
- Some keys are labelled with a symbol rather than a name. In this instance we substitute the symbol for the name in the text. Below is a list of those keys.

Table 1-1 Key symbol and name used in text

Key	Referred to in text as;
	Scale keys
	Change key

Control Description

The keyboard consists of 40 logically arranged keys. The unit confirms correct key input by releasing a single beep. Invalid key input is denoted by a series of beeps.

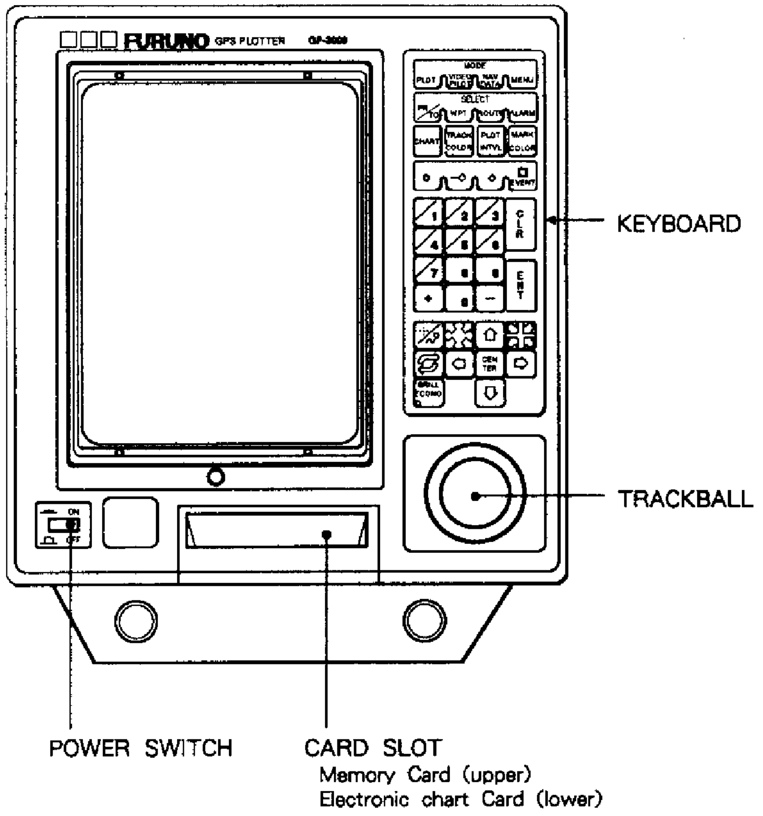


Figure 1-1 GD-3100/GP-3100 display unit

Table 1-2 Control description

Key/Control	Function
PLOT	Select plot display. Also functions to turn on/off data displays.
VIDEO PLOT	Select video pilot display. Also functions to turn on/off data displays.
NAV DATA	Select navigation data display.
MENU	Display or erase menu, display previous screen.
FR/TO	Set or cancel destination waypoint.
WPT	Register waypoints.
ROUTE	Register routes.
ALARM	Engage or disengage audible alarm.
CHART	Change attributes of factory-digitized electronic chart.
TRACK COLOR	Change track color.
PLOT INTVL	Each press selects a plot interval or stops recording track.
MARK COLOR	Change mark color.
MARK KEYS and EVENT	Enter mark/line. (EVENT: Output ship's position to navigator when pressed.)
Numeral Keys	Enter numeric data.
CLR	Clear an entire line of data, delete mark or waypoint, silence audible alarm.
ENT	Terminate keyboard input.
[+]	Change coordinate to North or East, turn on waypoint display, select route points.
[-]	Change coordinate to South or West, turn off waypoint display, deselect route points.
[+/●] (Cursor Key)	Turn cursor on or off.
, **(Scale Keys)**	Change chart scale.
(Change Key)	Change position indication method (L/L or Loran TDs), scroll page.
CENTER	Return own ship mark/cursor to screen center.
Arrow keys (↑, ↓, ←, →)	Shift display and cursor.
BRILL ECONO	Adjust screen brilliance and keyboard backlighting. Also functions to turn on/off the economy mode; press and hold down until the CRT turns off.

Turning the Power On and Off

Turning the power on

Press the **POWER** switch at bottom left-hand side of the unit. You will hear a "peep" when turning on the power.

Display after turning on power

After turning on the power the display changes in the sequence illustrated in Figure 1-2.

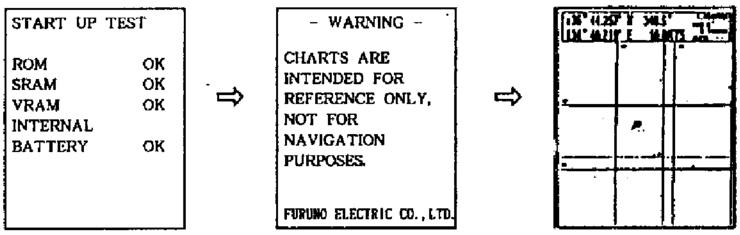


Figure 1-2 Display at power on

Notes for GP-3100

At the first power application after installation the unit takes about 15 – 45 minutes to acquire GPS satellite data, called the almanac. While the unit is acquiring the almanac, the indication "CST" appears at the top of the display. "CST" is replaced by "2D" or "ACQ" after the almanac is acquired.

If the vessel has moved more than 600 miles with the system turned off, reenter estimated position on the GPS INITIAL SETTINGS menu (key sequence: **MENU, 8,** [↑]).

Note for GD-3100/GP-3100

If asterisks appear instead of ship's position data, this means there is no navigation input. Check to make sure proper navigation aid is selected on the INITIAL SETTINGS menu.

Turning the power off

Press the **POWER** switch. All display contents (track, marks, waypoints) are kept alive by an internal battery.

The Trackball

Function of the trackball

The main function of the trackball is to shift the cursor and the display. They shift in the direction of trackball rotation.

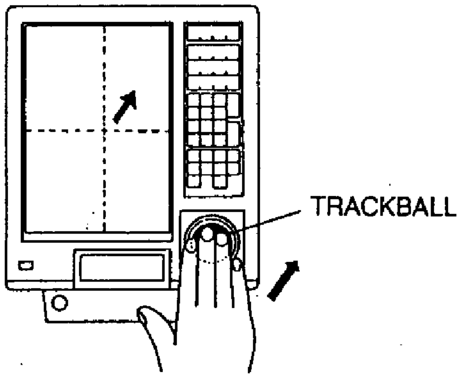


Figure 1-3 Operating the trackball, shifting the cursor (cursor on)

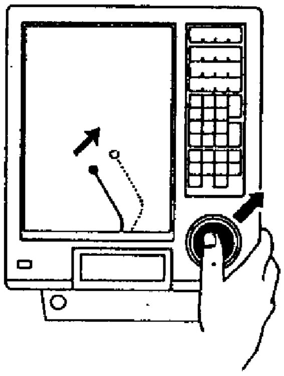


Figure 1-4 Operating the trackball, shifting the picture (cursor off)

Operating the Cursor

Function of the cursor

The cursor functions to

- find latitude and longitude of a location
- find range and bearing from your ship to position selected, and
- enter and erase marks, lines and waypoints.

Turning the cursor on or off

Each press of [+/●] turns the cursor on or off.

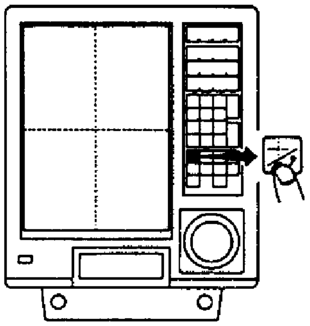


Figure 1-5 Location of the [+/●] (Cursor) key

Cursor information

Cursor position in latitude and longitude and the range and bearing from your ship to the cursor appear in the data window at the top of the display.

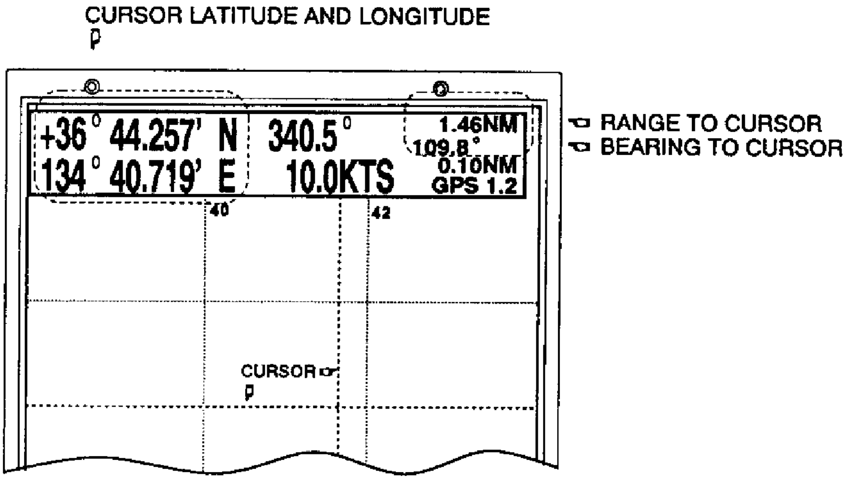


Figure 1-6 Location of cursor information

How to shift the cursor

With the cursor on, operate the trackball or the arrow keys to shift the cursor. Use the trackball for general placement and the arrow keys for fine tuning.

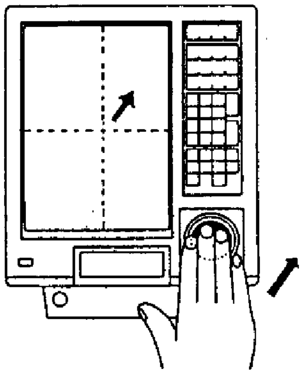


Figure 1-7 Shifting the cursor by the trackball

- **NOTE 1:** *The trackball shifts the cursor when the cursor is on and shifts the display when it is off.*

- **NOTE 2:** *You can change cursor configuration on the INITIAL SETTINGS menu. More on this later.*

Shifting the Display

The display can be shifted, when the cursor is off, by the trackball or arrow keys. The display shifts in the direction of trackball rotation or arrow key pressed. If you want to shift the picture rightward, for example, rotate the trackball rightward or press [→].

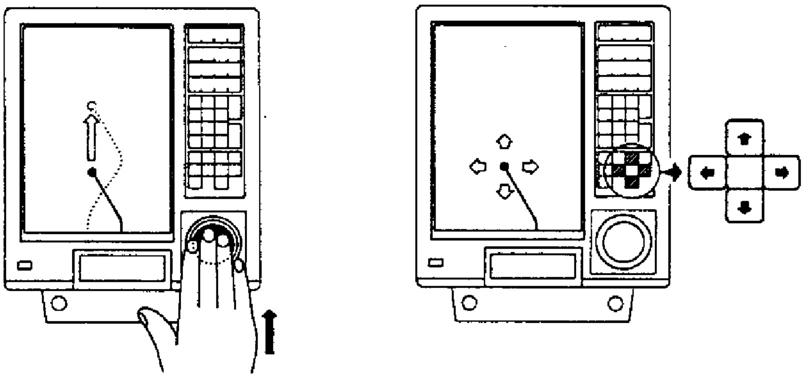


Figure 1-8 Shifting the display by the trackball and arrow keys

Returning own ship mark to screen center

You can return the own ship mark to the screen center by pressing **CENTER**.

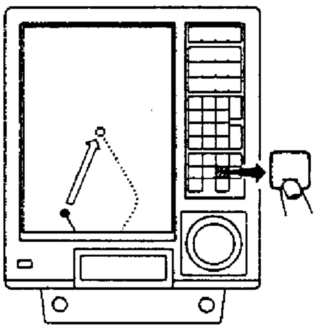


Figure 1-9 How to return own ship mark to screen center

Selecting screen center by cursor position

In normal usage your ship is at the screen center. If you want to select a land feature as the screen center, however;

1. Display the cursor (if it is not already displayed) by pressing [+ /●].
2. Operate the trackball to place cursor on position desired.
3. Press **CENTER**.

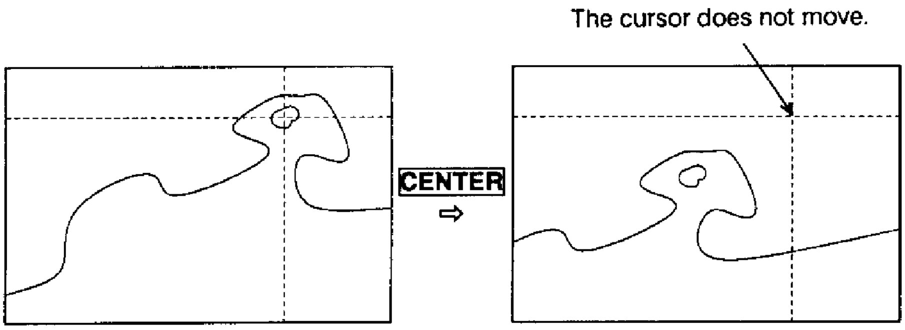


Figure 1-10 How to select screen center by cursor position

Selecting Chart Scale

The chart scale can be adjusted with the **Scale** keys. The direction of the arrows on the **Scale** keys indicates the direction in which the chart scale may be changed. Note that a larger range in essence shrinks the picture, and a smaller range "blows up" the picture. With a smaller range, you may find that the track appears in tiers.

The horizontal range of the display in nautical miles appears at the top right-hand corner of the DATA DISPLAY (2). Whenever the scale is changed the new range appears momentarily at the screen center.

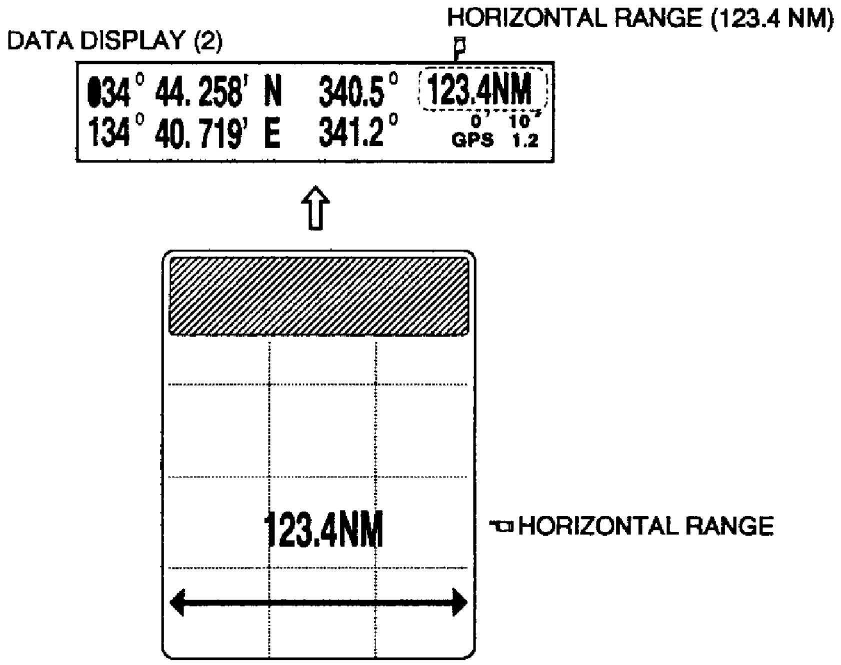


Figure 1-11 Location of chart scale indications

Adjusting Display Brilliance and Key Backlighting

The **BRILL ECONO** key adjusts display screen brilliance and keyboard backlighting in seven levels including off.

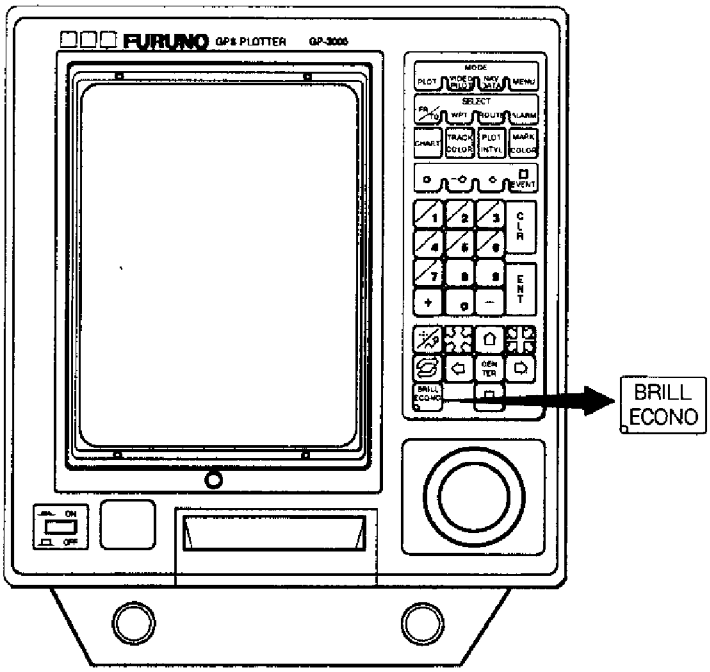


Figure 1-12 Location of BRILL ECONO key

Card Drives and the Factory-Digitized Chart

Card drives

The door at the bottom of the display hides two card drives:

- The upper slot is for memory cards which store display data (waypoints, tracks, and marks).
- The lower slot is for factory-digitized chart cards which contain electronic charts.

Displaying an electronic chart

Follow the procedure below to display an electronic chart with the power turned on.

1. Open the card slot door.

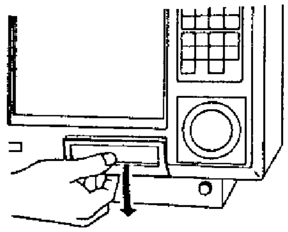


Figure 1-13 Location of card slot door

2. Insert a factory-digitized chart card label side up in the lower slot.

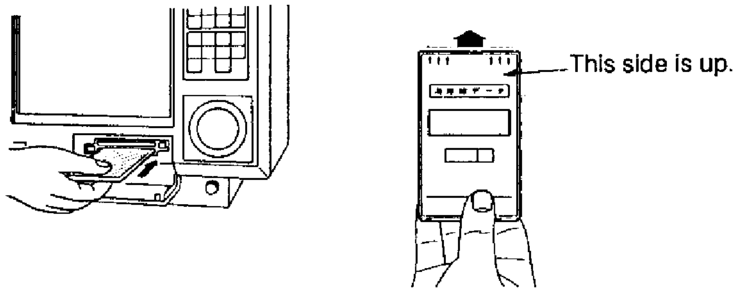


Figure 1-14 How to insert a factory-digitized chart card

3. Press **Scale** keys to display chart.

Ejecting the chart card

Press the eject button (left side).

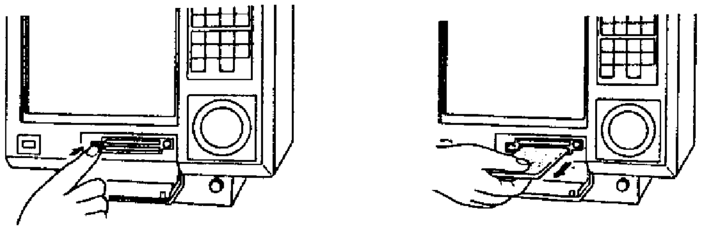


Figure 1-15 Ejecting a chart card

Care and handling of the cards

Both the factory-digitized chart card and the memory card must be handled with the utmost of care.

- Keep them away from direct sunlight, heat sources, and active gases.
- Keep cards away from water and chemicals.
- Keep the connector free of foreign material.
- Do not drop the cards.

Selecting a chart feature as screen center

You can select a chart feature as the screen center. If you want to make point A in Figure 1-16 the screen center, for example, do the following.

1. Operate **Scale** keys to display point A.
2. Operate the trackball (cursor on) to set the cursor intersection on point A.
3. Press **CENTER**.
4. Operate **Scale** keys to locate point A where desired.

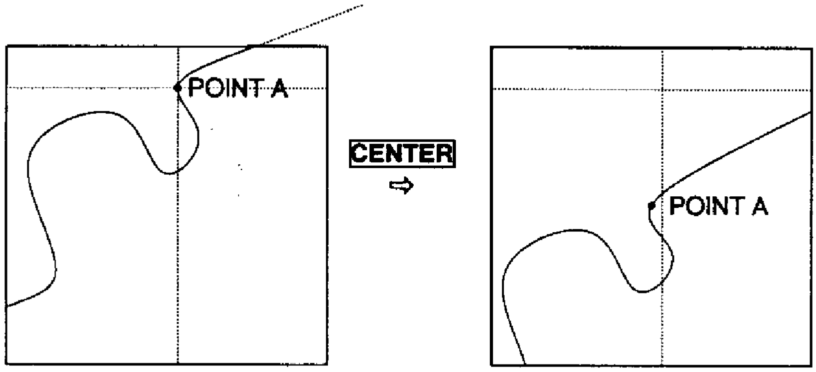


Figure 1-16 How to select a chart feature as screen center

What to do when...

- Chart does not disappear after removing card.
  Press **Scale** keys.
- Card inserted but chart does not appear.
  Press **Scale** keys.
- Small island or object is not filled in (it is hollow).
  Press **Scale** keys.
- Part of land on video pilot display is hollow.
  Shift display.

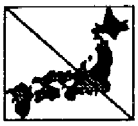
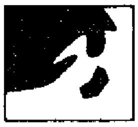
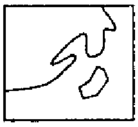
■ **NOTE 1:** *Land areas on a chart may be hollow if the chart is overenlarged.*

■ **NOTE 2:** *You can check chart reliability by the chart icon. See Table 1-3.*

Chart-related Icons

The display shows three different icons to alert the operator to chart status. These are as described in Table 1-3.

Table 1-3 Chart-related icons

Icon	Reason Displayed	Remedy
	• Card is not inserted properly. • Chart overenlarged.	• Insert card. • Shrink chart by **Scale** keys.
	• This icon means the chart is displayed properly; full chart reliability.	
	• This icon means poor chart reliability because chart is overenlarged.	Use chart with extreme caution. Shrink chart by **Scale** keys.

The Data Window

The data window at the top of the display shows various navigation information. What information is displayed depends on whether the cursor is on or off and the status of the **PLOT** key or **VIDEO PILOT** key. Figures 1-17 and 1-18 show what appears in the data window under those conditions.

Data shown when cursor is on

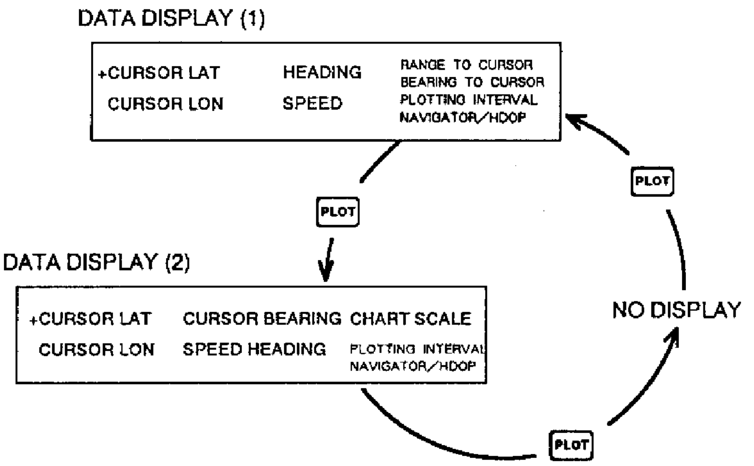


Figure 1-17 Information displayed in data window when cursor is on

Data shown when cursor is off

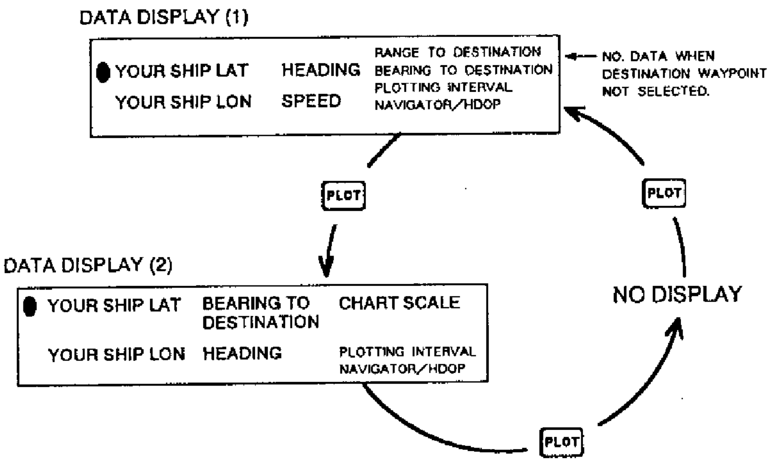


Figure 1-18 Information displayed in data window when cursor is off

Selecting Display Mode

This unit has three display modes: Plot, Video Pilot and Navigation Data. These modes may be displayed by pressing **PLOT**, **VIDEO PILOT**, and **NAV DATA**, respectively.

Plot mode

This mode provides general positioning information and shows

- latitude and longitude grid
- own ship mark
- factory-digitized chart
- ship's track
- marks, and
- waypoints.

Video pilot

The video pilot mode provides ship piloting information and features the following.

- Own ship mark is triangle shaped and shows bow bearing.
- Grid shows distance in nautical miles from own ship.
- Course up display
- ETA and TTG to waypoint

Nav data

This display shows navigation information such as

- speed
- course
- data from external sensors (water temperature, depth, etc.)
- position, and
- GPS satellite information (GP-3100 only).

The Menu

Menu operation versus key operation

Many functions of the 3100 can be executed through the menu or by pressing the key associated with function desired. For example, you can enter a waypoint by pressing **WPT** or **MENU** and **1**. To display the menu, press **MENU**. Figure 1-19 shows the menu. For complete description of the menu, see the Appendix.

MENU	
1	WAYPOINT
2	ROUTE
3	SAVE DATA TO MEMORY CARD
4	LOAD MEMORY CARD
5	DISPLAY MEMORY CARD
6	CORRECT POSITION
7	APPORTION/DELETE MEMORY
8	INITIAL SETTINGS
9	MISC
SELECT BY USING NUMBER KEY.	

Figure 1-19 Menu

Selecting a menu

Press appropriate number key.

Operation on the Display

Selecting item

As you move the **item selection cursor** (red triangle) down through a menu by pressing [↑]/ [↓], the **option selection cursor**, initially colored in light-blue, changes to red. This indicates current selection for line selected.

Selecting option

To select options;

1. Press [↑]/ [↓] to place the item selection cursor on the item you want to change.
2. Press [←]/[→] to place the option selection cursor on the option desired.

Entering data

The reverse video "square" on the display is the data input cursor. Press [←]/[→] to locate the cursor where you want to enter data, and then enter appropriate data with the numeral keys.

■ **NOTE:** *The entry of the leading zero is necessary, but the entry of trailing zeroes is optional. For example, if you want to enter 7, press* **0** *and* **7**.

Summary of menu operation

Figure 1-20 shows how to select items and options on the DESTINATION SETTING menu, which appears by pressing **FR/TO**.

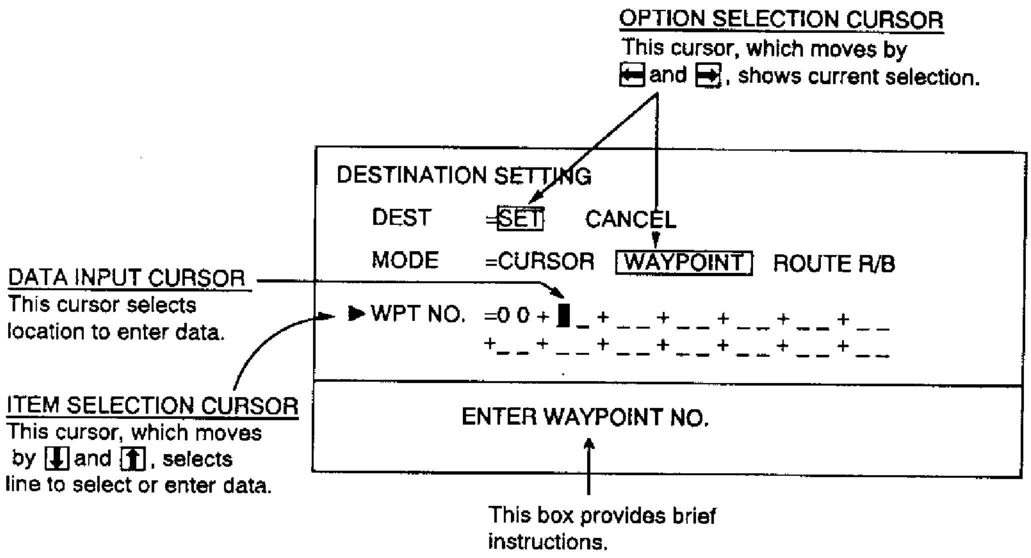


Figure 1-20 DESTINATION SETTING menu

Turning off Track Recording

Why turn off track recording?

When your ship is at anchor or returning to port you probably will not need to record the track. You can stop recording the track, to conserve the track memory, by actuating the "HOLD" function. The track is displayed but not recorded, thereby conserving the track memory.

Turning off track recording

Press **PLOT INTVL** to display HOLD.

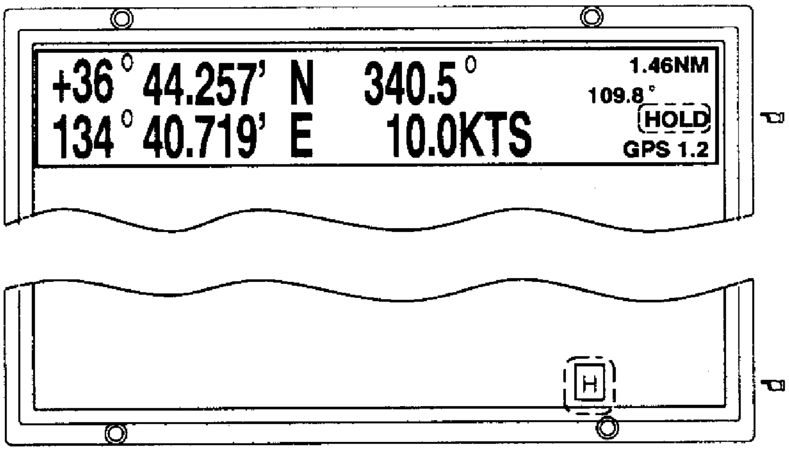
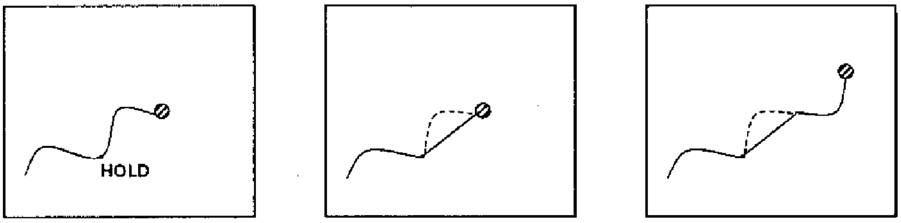


Figure 1-21 Location of "HOLD" indications

What happens during HOLD?

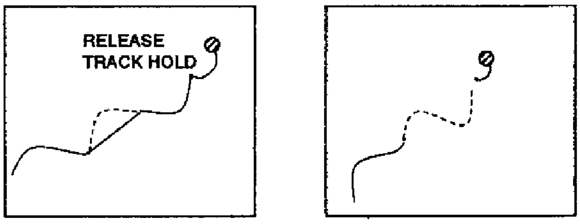
- "HOLD" and "H" appear on the display.
- The track is traced on the display but not stored in the memory.
- When the display is redrawn, when operating the **Scale** keys, for example, the track during the time a key is operated is erased and when the key is released a line connects the points where the key was operated and released.



(a) Track displayed during track hold.

(b) Track erased when display is redrawn.

(c) Track is redrawn.



(d) Actual track displayed at release of track hold.

(e) Actual track is erased when display is redrawn during hold or track hold is released.

Figure 1-22 Display and track hold on/off

Restarting track recording

Press **PLOT INTVL** to erase the "HOLD" indications. The track points where track recording was stopped and restarted are not connected.

■ **NOTE 1:** *As noted earlier ship's track during HOLD is displayed. You can turn it off if desired. For further details, see page 3-26.*

■ **NOTE 2:** *The locations where track recording was stopped and restarted can be connected with a line, after recording is restarted. See page 3-26.*

Marks

You can electrically inscribe marks on the display to denote important locations. Up to 4000 marks (default setting) can be entered. The following marks are available:

- circle
- diamond
- square
- numeral (1 – 9)
- plus mark, and
- minus mark.

■ **NOTE:** *Other types of marks are available when you edit marks through the EDIT TRACK/MARK menu. More on this in a later chapter.*

Mark memory

When the mark memory is full no marks can be entered. In this case erase marks individually or collectively (**MENU**, **7**, **3** and **ENT**.)

Entering mark at cursor intersection

Follow the procedure below to enter a mark at the cursor intersection.

1. Place cursor on latitude and longitude position desired for mark.
2. Press mark key desired. To inscribe a diamond, for example, press [◇].

Entering mark at your ship's position

To enter a mark at own ship position;

1. Turn off the cursor by pressing [+/♦].
2. Press mark key desired. To inscribe a square, for example, press [□].

Changing mark color

Mark color is available in the colors shown on keys 1 – 7. When a mark is entered, it is inscribed in the color of the cursor mark in the data window at the top of the display. You change mark color freely through the CHANGE MARK COLOR menu.

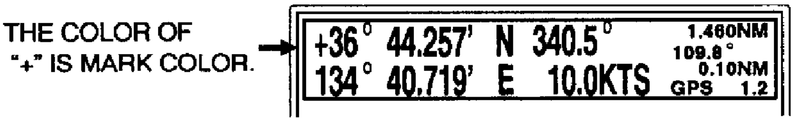


Figure 1-23 Location of mark color indication

To change mark color;

1. Press **MARK COLOR**. The CHANGE MARK COLOR menu appears.

```
CHANGE MARK COLOR
▶MARK COLOR = [1] 2 3 4 5 6 7

SELECT MARK COLOR BY NUMBER.
```

Figure 1-24 CHANGE MARK COLOR menu

2. Press a key among 1–7. To color future marks blue, for example, press **6**.
3. Press **ENT**.

Deleting a mark

To delete a mark;

1. Operate the trackball (cursor on) to place the cursor intersection on the center of the mark you want to delete.
2. Press **CLR**.

■ **NOTE 1:** *If a mark cannot be erased there may be several marks superimposed on one another. In this case, press* **CLR** *several times.*

■ **NOTE 2:** *Marks played back from a memory card cannot be erased.*

Clearing the Display Screen

When the display screen becomes full of tracks, marks and waypoints you can clear it by following the procedure below.

1. Press **MENU**. The menu appears.

```
MENU
1 WAYPOINT
2 ROUTE
3 SAVE DATA TO MEMORY CARD
4 LOAD MEMORY CARD
5 DISPLAY MEMORY CARD
6 CORRECT POSITION
7 APPORTION/DELETE MEMORY
8 INITIAL SETTINGS
9 MISC
SELECT BY USING NUMBER KEY.
```

Figure 1-25 Menu

2. Press **9** to display the MISC menu.

```
9 MISC
1 EDIT TRACK/MARK
2 CALCULATE RANGE/BEARING
3
4
5
6 SPECIAL
7 SELECT MARKS/CONTOUR LINES
8 CLEAR MEMORY
9 SELF TEST
SELECT NUMBER.
```

Figure 1-26 MISC menu

3. Press **8** to display the CLEAR MEMORY menu.

```
9-8 CLEAR MEMORY
1 CLEAR SCREEN DATA
2 CLEAR ALL GD DATA
3 CLEAR GPS DATA
4 CLEAR ALL DATA
SELECT NUMBER.
```

Figure 1-27 CLEAR MEMORY menu

4. Press **1** to select CLEAR SCREEN DATA.

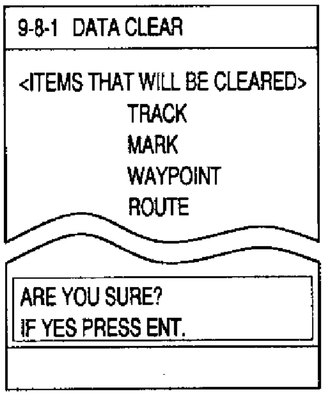


Figure 1-28 CLEAR SCREEN DATA display

5. Press **ENT** to clear screen data, or **MENU** to escape.

Economy Mode

The economy mode turns off the CRT while continuing to record the track. This lessens power consumption (power consumption: less than 10 watts). To turn on the economy mode, press and hold down **BRILL ECONO** until the CRT goes off. To escape from the economy mode, press any key.

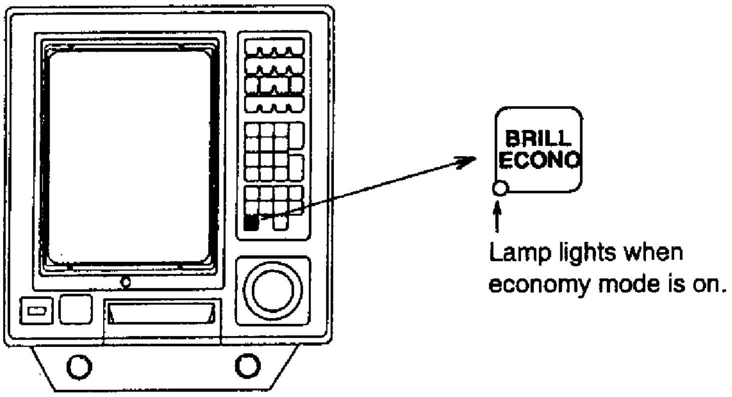
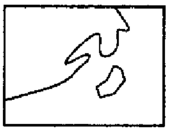
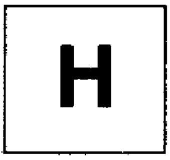
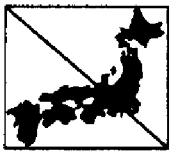
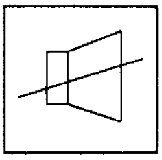
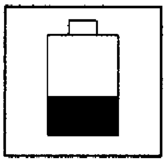
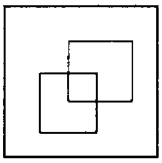
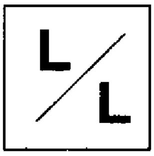


Figure 1-29 Location of BRILL ECONO key

Interpreting the Display Icons

Various icons appear at the bottom right-hand corner on the display to alert the operator. Table 1-4 explains the meaning of the icons.

Table 1-4 Display icons

Chart data reliable.	 Chart overenlarged; chart data may be unreliable.
 Track recording turned off (track hold).	 Chart overenlarged or wrong chart.
 Alarm violation. Icon disappears when alarm is disengaged or cause of alarm is removed.	 Low voltage of memory card battery or battery on GDC Board; replace battery at earliest convenience.
 Chart position offset applied on CORRECT POSITION menu.	 L/L position offset applied on GPS INITIAL SETTINGS menu (GP-3100).

Course Vector and Time Mark

Course vector

The course vector displays your ship's course by position information taken from a navigation device. The vector can be turned on or off and its appearance changed through the INITIAL SETTINGS menu. More on this in a later section.

■ **NOTE 1:** *The vector shows your ship's course, not bow direction. Further, it does not appear when the ship's speed is less than 0.2 kts.*

■ **NOTE 2:** *The appearance of the course vector can be changed on the INITIAL SETTINGS menu (MENU 8).*

Time mark

The time mark denotes your ship's position on the trackline using 24-hour clock notation. For example, "T08" marked on the track means ship's position at 08:00 a.m. Time marks cannot be deleted individually. However, they are deleted when the track is deleted.

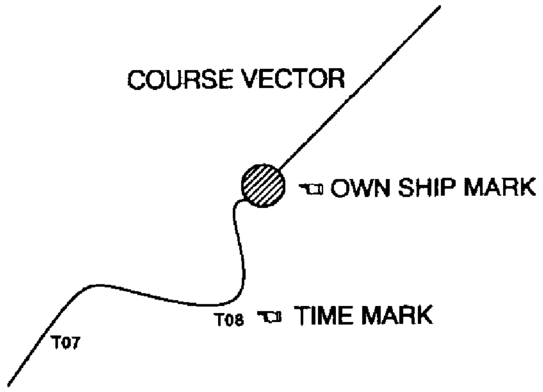


Figure 1-30 Course vector and time mark

■ **NOTE:** *The time mark display can be turned off on MENU 96.*

Sample Plot Displays

Information displayed on a plot display depends on whether the cursor is on or off. Figures 1-31 and 1-32 show sample plot displays with the cursor on and off, respectively.

Plot display when cursor is on

Figure 1-31 shows a sample plot display when the cursor is on.

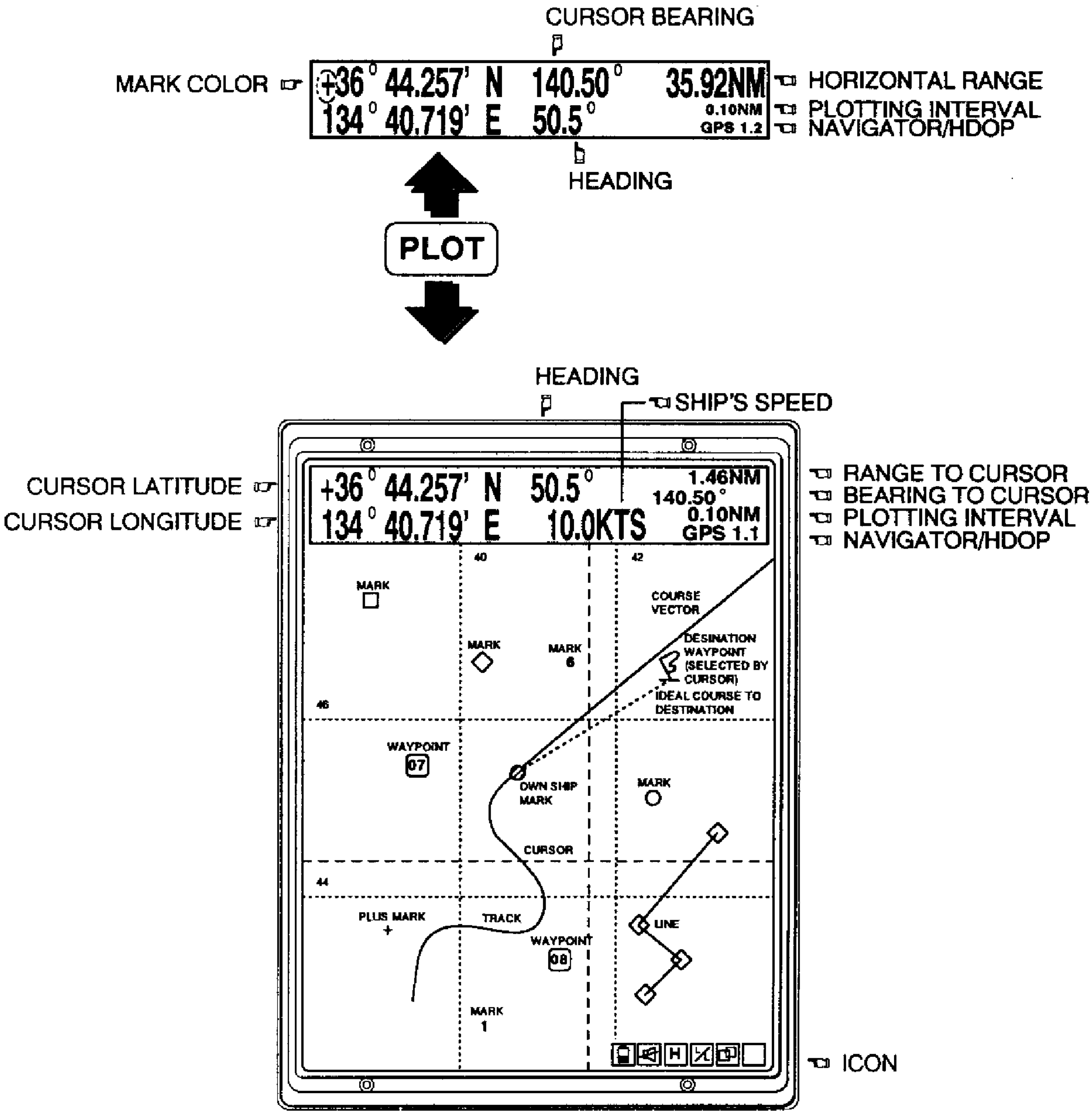


Figure 1-31 Sample plot display, cursor on

Plot display when cursor is off

Figure 1-32 shows a sample plot display when the cursor is off.

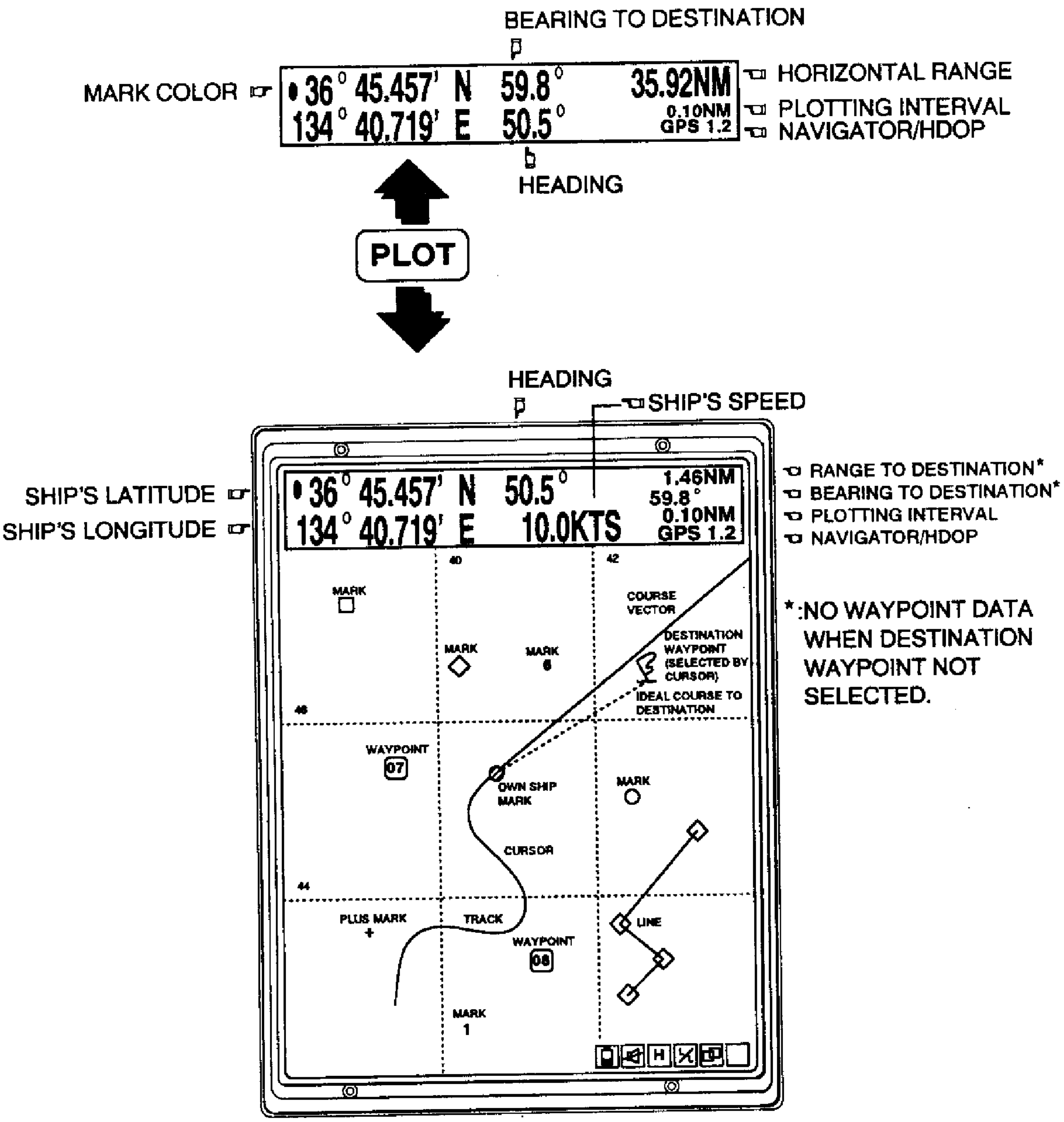


Figure 1-32 Sample plot display, cursor off

INTERMEDIATE LEVEL OPERATION

This chapter deals with intermediate level functions such as changing track color, entering waypoints, and the video pilot and navigation data displays.

Section 1 – Plot Display 2-3
Section 2 – Video Pilot & Navigation Data Displays 2-42

SECTION 1

Plot
Display

Setting the Time and Date

The internal clock marks time and is used to perform navigation calculations (for example, time-to-go). Set it as follows.

1. Press **MENU**.
2. Press **8** to display the INITIAL SETTINGS menu.

```
8 INITIAL SETTINGS

  VTD AVG TIME        =10MIN
▶ DATE                =1992-05-29  (YYYY-MM-DD)
  TIME                =10: 01: 50
  EXTERNAL CLOCK      =[ON]     OFF
  AUTOPILOT DISPLAY=  [ON]      OFF
  TD INDICATION       =LA     LC    [OFF]
```

Figure 2-1 INITIAL SETTINGS menu

3. Press [↑]/[↓] to select DATE.
4. Enter date; year, month and day in that order. Enter year in four digits and month and day in two. To enter April 10, 1993, for example, press;

   [1] [9] [9] [3] [0] [4] [1] [0]

5. Press [↓] to select TIME.
6. Enter time by 24-hour notation. To enter 18:30, for example, press;

   [1] [8] [3] [0] [0] [0]

7. Press **ENT**.

■ **NOTE:** *The time on the navigation data display is updated continually by the internal clock but the time display on the INITIAL SETTINGS menu is not updated.*

Changing Track Color

The default track color is red, but you may change track color to any one of seven colors.

1. Press **TRACK COLOR** to display the CHANGE TRACK COLOR menu.

```
CHANGE TRACK COLOR
▶TRK COLOR = [1]  2  3  4  5  6  7

SELECT TRACK COLOR BY NUMBER.
 – : DELETE TRACK
```

Figure 2-2 CHANGE TRACK COLOR menu

2. Press appropriate numeral key to select color.
   - 1: Red
   - 2: Yellow
   - 3: Green
   - 4: Light-blue
   - 5: Purple
   - 6: Blue, or
   - 7: White

■ **NOTE:** *You can also change track color (on the CHANGE TRACK COLOR menu) by pressing [←]/[→] to select appropriate color number and then* **ENT**.

Deleting Track by Color

One method of deleting unwanted track is specifying track color. *NOTE THAT DELETED TRACK CANNOT BE RESTORED.*

1. Press **TRACK COLOR** to display the CHANGE TRACK COLOR menu.

```
CHANGE TRACK COLOR
▶TRK COLOR = [1] 2 3 4 5 6 7

  SELECT TRACK COLOR BY NUMBER.
  – : DELETE TRACK
```

Figure 2-3 CHANGE TRACK COLOR menu

2. Press [–], and then press a numeral key among 1–7 to select color to delete. If you want to delete all yellow color track, for example, press [–] and **2**.

■ **NOTE:** *You can delete all track by pressing* **MENU**, **7**, **2** *and* **ENT**.

Entering Waypoints

What is a waypoint?

In navigation terminology, a particular location is known as a "Waypoint," whether it be a starting point, a destination point or an intermediate point on a voyage.

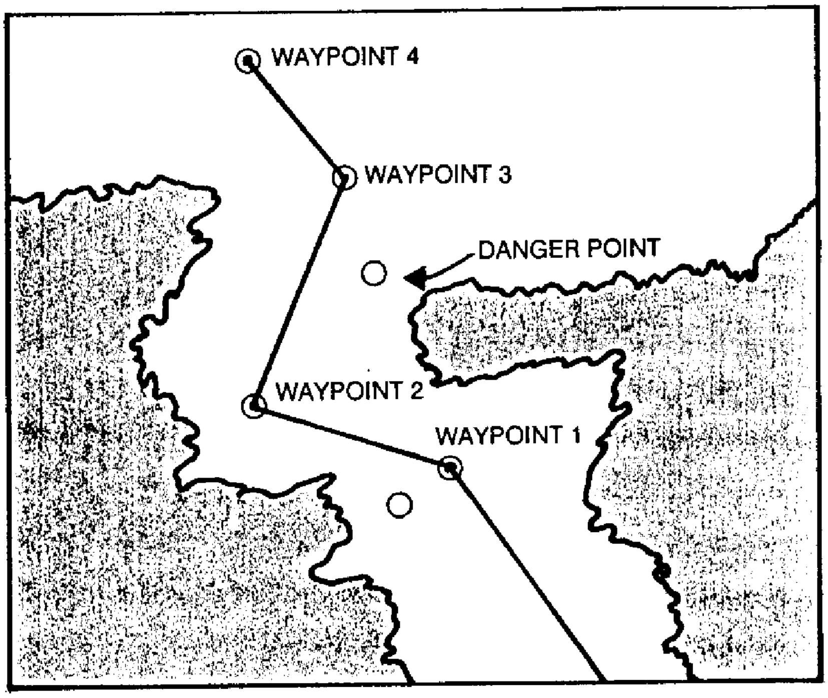


Figure 2-4 Waypoints

Guidelines for entry of waypoint

The 3100 has 98 waypoints into which you can enter position information. They are numbered from "zero-zero" (00) to ninety-nine (99) and colored yellow. (Waypoint color cannot be changed.)

Some people might search through the waypoints already stored in the unit in order to find an empty waypoint in which to insert new information. However, it is probably less confusing to insert data sequentially, starting at waypoint one and proceeding upwards, one by one, in the sequence that the waypoints will actually be encountered on the voyage.

Obviously, it's important that you write down your voyage plan in your log so that you have a permanent record of which waypoint is which. Some operators prefer to reserve waypoint ninety-eight as a sort of "scratchpad," so that any interesting position information they might for instance hear on the radio may be entered at the moment it is heard. Any position data that have been stored in other waypoints thus will not be disturbed, or even lost, in the heat of the moment.

Comments for waypoints

To help you identify waypoints, you can enter a comment. More on this later.

Special waypoints

Waypoint "00" is reserved for use when your present position is used as a destination waypoint, to find range and bearing to a point. This will be explored in more detail later.

Waypoint "99" is an external waypoint where "To" waypoint selected on the connected navaid is automatically stored.

Entering a waypoint

A waypoint may be entered by

- latitude and longitude coordinates
- the cursor
- your ship's position
- range and bearing
- waypoint list, and
- navigation aid.

By L/L coordinates

Let us assume for purposes of illustration that you wish to enter the position of San Francisco into waypoint Zero Six. The coordinates are: 37 degrees, 40.000 minutes North Latitude, and 122 degrees, 24.000 minutes West Longitude. The keying sequence would be as follows:

1. Press **MENU**.
2. Press **1** to display the WAYPOINT list.

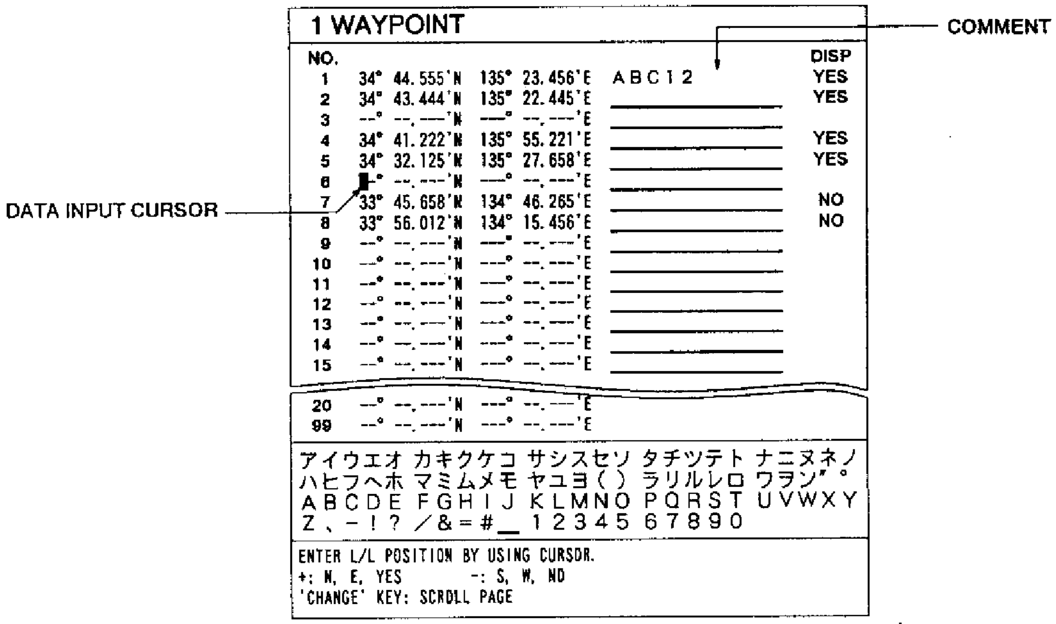


Figure 2-5 Sample waypoint list

3. Press [↑]/[↓] to place the data input cursor on waypoint 6.
4. Enter latitude.

[3] [7] [4] [0] [0] [0] [0]

■ **NOTE 1:** *To cancel or change data;*

Cancel entire line of data: Press **CLR**.

Change data: Place data input cursor on wrong data by pressing [←]/[→] and reenter data.

■ **NOTE 2:** *The [+] and [-] keys serve to change coordinate:*

[+] key: Change coordinate to North or East.
[-] key: Change coordinate to South or West.

5. Press [→] to advance the data input cursor to the first digit of longitude and then enter longitude.

[-] [1] [2] [2] [2] [4] [0] [0] [0]

7. Enter comment, if desired.
8. Press **ENT**.

By cursor

1. Press **WPT** to display the REGISTER WAYPOINT menu.

```
REGISTER WAYPOINT
  MODE    = [CURSOR] L/L   OS POS.   R/B   LIST
▶ WPT NO.  = ■-

  ENTER WAY POINT NO., AND DESIGNATE WAYPOINT
  POSITION BY
  USING CURSOR .                 + : DISPLAY
                                 - : NOT DISPLAY
```

Figure 2-6 REGISTER WAYPOINT menu

2. Press arrow keys to select CURSOR on the MODE line, if it is not already selected.
3. Press [↓] to select WPT NO.
4. Enter waypoint number in two digits. If the waypoint number is 07, for example, press **0** and **7**.

- **NOTE 1:** *If the waypoint number is already used, "(USED)" appears to alert you. You can enter new number by pressing* **CLR**, *or overwrite the waypoint by going to step 5.*

- **NOTE 2:** *You can register a waypoint without entering waypoint number, in which case the unit automatically registers the waypoint in the youngest, unused waypoint. For example, if waypoints 01, 02, 04 and 05 are used when you enter a waypoint without designating waypoint number, the unit will register that waypoint as waypoint number 03.*

5. Operate the trackball to place cursor on position desired.
6. Press **ENT**.
7. Press **WPT** to erase the menu.

At your ship's position

The procedure which follows shows how to enter a waypoint at your ship's position.

1. Press **WPT** to display the REGISTER WAYPOINT menu.
2. Operate arrow keys to select OS POS.

```
REGISTER WAYPOINT
▶MODE     = CURSOR  L/L  [OS POS]  R/B  LIST
 WPT NO.  = – –

 ENTER WAYPOINT NO., AND DESIGNATE
 WAYPOINT POSITION BY
 USING CURSOR.                  + : DISPLAY
                                – : NOT DISPLAY
```

Figure 2-7 REGISTER WAYPOINT menu

3. Press [↓] to select WPT NO.
4. Enter waypoint number in two digits.
5. Press **ENT**.
6. Press **WPT** to erase the menu.

By range and bearing

This method is useful when you want to enter a waypoint using range and bearing to a target found on radar.

1. Press **WPT** to display the REGISTER WAYPOINT menu.
2. Operate arrow keys to select R/B.

```
REGISTER WAYPOINT
▶MODE   = CURSOR  L/L  OS POS.  [R/B]  LIST
 WPT NO. =  - -
 RANGE  = - - - . - - - NM
 BEARING= - - - . -°    MAG
-----------------------------------------------
 ENTER WAYPOINT NO., RANGE AND BEARING.
 PRESS ENT TO DISPLAY WPT L/L.
 PRESS ENT AGAIN TO REGISTER WAYPOINT.
        + : DISPLAY      - : NOT DISPLAY
```

Figure 2-8 REGISTER WAYPOINT menu

3. Press [↓] to select WPT NO.
4. Enter waypoint number in two digits.
5. Press [↓] to select RANGE.
6. Enter range.
7. Press [↓] to select BEARING.
8. Enter bearing.
9. Press **ENT** to calculate postion. The latitude and longitude position of the range and bearing entered appears on the display.
10. Press **ENT** again to register the waypoint.

By navigation aid

The “TO” waypoint selected on the navigation aid connected is automatically sent to the 3100 as an “external waypoint.”

Entering a comment

You can enter a comment for a waypoint, in the WAYPOINT list. The comment can consist of up to 10 alphanumeric characters.

1. Press **MENU** and **1** to display the WAYPOINT LIST.
2. Press arrow keys to set data input cursor on the line desired in the comments column.
3. Operate the trackball to circumscribe the first character for your comment. You can select upper and lower case characters by the **Scale** keys, as shown in Figure 2-9.

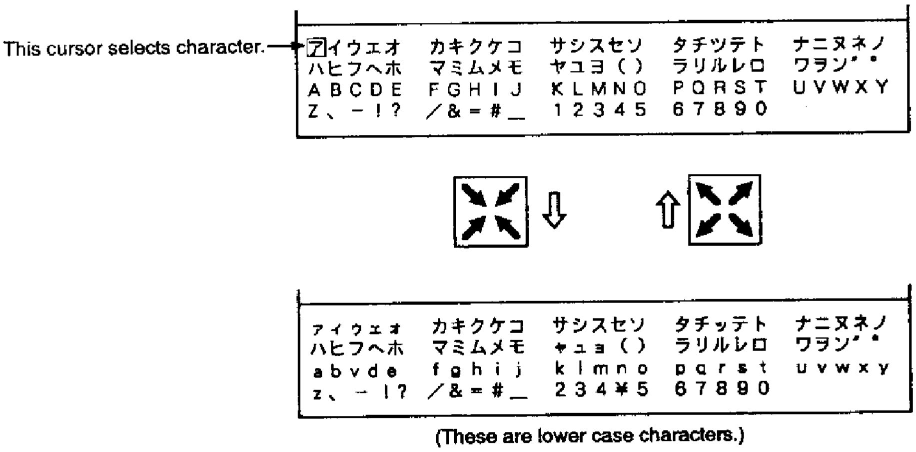


Figure 2-9 Characters available for use as a waypoint comment

4. Press **ENT**.

■ **NOTE:** *If you enter a wrong character, set the data input cursor on wrong character and then enter correct character.*

5. Repeat steps 3 and 4 to complete comment.
6. Press [→] to set the cursor out of the comments column and then press **ENT**.

Turning Specific Waypoint Display On or Off

You can turn a specific waypoint on or off.

Turning off

By REGISTER WAYPOINT menu

1. Press **WPT** to display the REGISTER WAYPOINT menu.

```
REGISTER WAYPOINT
▶MODE  = [CURSOR]  L/L OS POS.  R/B  LIST
  WPT NO.=█-

  ENTER WAYPOINT NO., AND DESIGNATE WAYPOINT
  POSITION BY USING CURSOR .
```

Figure 2-10 REGISTER WAYPOINT menu

2. Press arrow keys to select L/L on the MODE line.
3. Press [↓] to select WPT NO.
4. Press [–], enter the waypoint number you want to turn off and then press **ENT**. If the waypoint you want to turn off is 36, for example, press [–], **3**, **6** and **ENT**.

By waypoint list

1. Press **MENU** to display the menu.
2. Press **1** to display the WAYPOINT list.

1 WAYPOINT

NO.				DISP ← DISP
1	34° 44.555'N	135° 23.456'E	A B C 1 2	YES
2	34° 43.444'N	135° 22.445'E	________	YES
3	--° --.---'N	---° --.---'E	________	
4	34° 41.222'N	135° 55.221'E	________	YES
5	34° 32.125'N	135° 27.658'E	________	YES
6	--° --.---'N	---° --.---'E	________	
7	--° --.---'N	---° --.---'E	________	YES
8	--° --.---'N	---° --.---'E	________	YES
9	--° --.---'N	---° --.---'E	________	
10	█-° --.---'N	---° --.---'E	________	
11	--° --.---'N	---° --.---'E	________	
12	--° --.---'N	---° --.---'E	________	
13	--° --.---'N	---° --.---'E	____	

Figure 2-11 Sample waypoint list

3. Press [↑]/[↓] to place the cursor on the waypoint (number) you do not want to display.
4. Press [→] to set the cursor in the DISP column.
5. Press [–] to display NO.
6. Press **ENT**.

Turning on

By REGISTER WAYPOINT menu

To turn on waypoint 36, for example, press **WPT**, **3**, **6** and **ENT**.

By waypoint list

1. Press **MENU** to display the menu.
2. Press **1** to display the WAYPOINT list.
3. Press [↑]/[↓] to place the cursor on the waypoint you want to display.
4. Press [→] to set cursor in the DISP column.
5. Press [+].
6. Press **ENT**.

■ **NOTE:** *You can turn off all waypoints through the INITIAL SETTINGS menu.*

Deleting Waypoints

You can delete unnecessary waypoints by the cursor or through the waypoint list.

By cursor

You can delete a waypoint by using the cursor.

1. Operate the trackball to place the cursor intersection on the center of the waypoint you want to delete.
2. Press **CLR**.

By waypoint list

The procedure which follows shows how to delete a waypoint through the WAYPOINT list.

1. Press **MENU** followed by **1** to display the WAYPOINT list.
2. Press [↑]/[↓] to select waypoint (number) you want to delete.
3. Press **CLR**.
4. To delete another waypoint, repeat steps 2 and 3.
5. Press **ENT**.

Deleting external waypoint

To delete an external waypoint (99);

1. Cancel destination waypoint on connected navigation aid.
2. Display the cursor and operate the trackball to place the cursor intersection on waypoint 99.
3. Press **CLR**.

Destination Waypoint

What is a destination waypoint?

By setting a destination waypoint, you can find the range and bearing from your vessel to a latitude and longitude position. You can set a destination waypoint by

- cursor
- waypoint number
- range and bearing, and
- route number. (This is a special method so it is dealt with in a later section.)

Setting a destination waypoint

By cursor

To select destination waypoint by cursor;

1. Press **FR/TO** to display the DESTINATION SETTING menu.

```
DESTINATION SETTING
▶DEST   =[SET]  CANCEL
 MODE   =[CURSOR]  WAYPOINT  ROUTE  R/B

SELECT DESTINATION BY USING CURSOR AND PRESS
ENT.
INTERMEDIATE POINTS CAN BE SET BY USING + KEY.
```

Figure 2-12 DESTINATION SETTING menu

2. Press arrow keys to select CURSOR.
3. Operate the trackball to place cursor on latitude and longitude position desired for destination waypoint.
4. Press **ENT**.

By waypoint number

Follow the procedure below to set a destination waypoint by (registered) waypoint number.

1. Press **FR/TO** to display the DESTINATION SETTING menu.

```
DESTINATION SETTING
▶DEST    = [SET]  CANCEL
 MODE    = CURSOR [WAYPOINT] ROUTE  R/B
 WPT NO. = 00+--+--+--+--+--+--+--+--+
             +--+--+--+--+--+--+--+--+-
ENTER WAYPOINT NO.
```

Figure 2-13 DESTINATION SETTING menu

2. Press arrow keys to select WAYPOINT.
3. Press [↓] to select WPT NO.
4. Enter waypoint number(s) in two digits. If the waypoint number is 07, for example, press **0** and **7**.
5. Press **ENT**.

■ **NOTE:** *The message "DATA ERROR" appears on the display when the waypoint number entered is not registered.*

By range and bearing

Follow the procedure below to set a destination waypoint by range and bearing.

1. Press **FR/TO** to display the DESTINATION SETTING menu.
2. Press arrow keys to select R/B.
3. Press [↓] to select RANGE.
4. Enter range.
5. Press [↓] to select BEARING.
6. Enter bearing.
7. Press **ENT** twice.

After setting a destination waypoint...

- The DESTINATION SETTING menu disappears.
- Destination waypoint is marked with a yellow flag (except destination set by registered waypoints).
- Your ship's position is shown as waypoint 00.
- A light-blue dashed line connects your ship's position with destination waypoint. This line shows the ideal course.

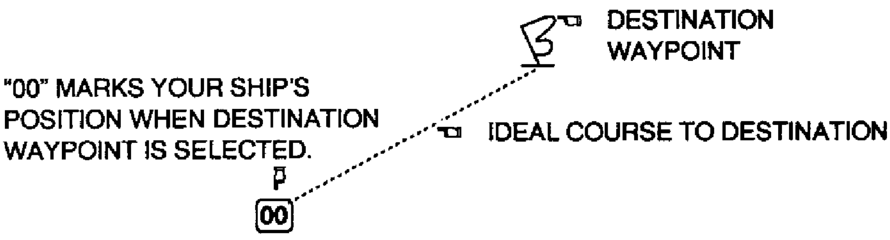


Figure 2-14 How a destination waypoint is shown on the display

Displaying range and bearing to destination waypoint

To display the range and bearing to the destination waypoint, press **PLOT** to display DATA DISPLAY (2).

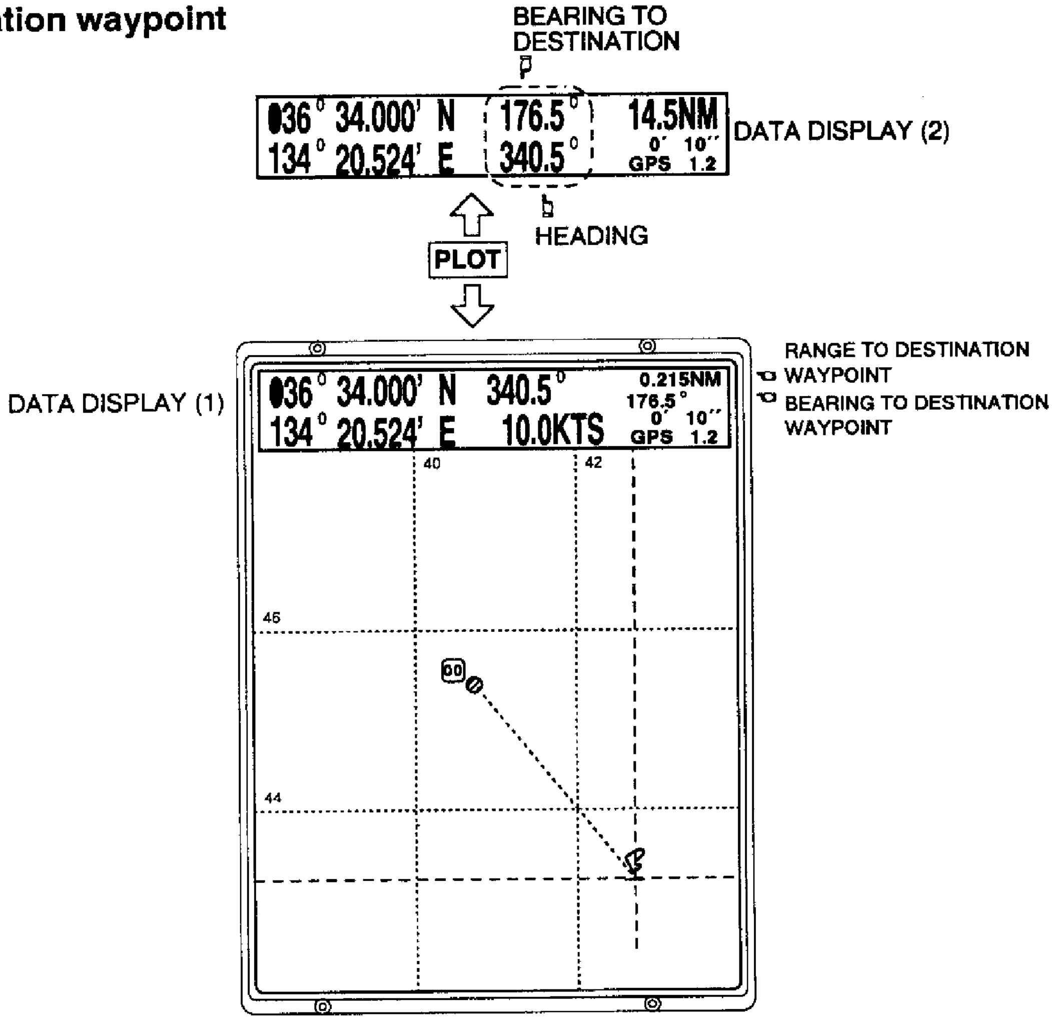


Figure 2-15 Location of destination waypoint information

Cancelling Destination Waypoint

Once you arrive at your destination you probably won't need the destination waypoint. You can cancel it, by one of three methods.

Through the menu

To cancel a destination waypoint through the menu;

1. Press **FR/TO** to display the DESTINATION SETTING menu. The first line shows the latitude and longitude of the current destination waypoint for your confirmation.

```
DESTINATION SETTING
▶DEST     = [SET]  CANCEL
 MODE     = CURSOR [WAYPOINT] ROUTE R/B
 WPT NO. = 00+--+--+--+--+--+--+--+
              +--+--+--+--+--+--+--+-
 ENTER WAYPOINT NO.
```

Figure 2-16 DESTINATION SETTING menu

2. Press [↑] to select DEST, if it is not already selected.
3. Press [→] to select CANCEL.
4. Press **ENT**.

By key input

Method 1: Press **FR/TO, CLR** and **ENT**.

Method 2: Press **FR/TO, 0** and **ENT**.

Alarms

There are six conditions that can trigger audible and visual alarms in this unit:

- Arrival alarm
- Anchor Watch alarm
- Cross-track Error (XTE) alarm
- Border alarm, and
- Ship's Speed alarm (two types).

Up to three alarms can be actuated. When an alarm setting is breached, the audible alarm sounds and the alarm icon appears at the bottom right-hand corner of the display.

■ **CAUTION:** *The alarms are useful for alerting you to possibly dangerous situations. However, the captain is always responsible for the safe operation of his ship. FURUNO Electric Company will assume no responsibility for any damages associated with the use of the alarms.*

Arrival alarm

The arrival alarm warns you your ship is approaching a destination waypoint. The area that defines an arrival zone is that of a circle which you approach from outside the circle. The alarm will be released if your ship enters into the circle.

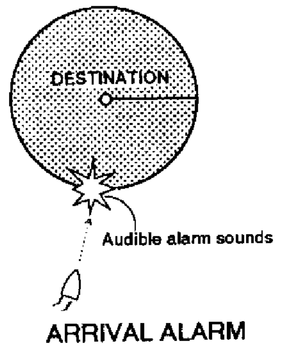


Figure 2-17 How the arrival alarm works

To set an arrival alarm limit of 0.05 nautical miles for waypoint 07 (destination waypoint), for example, you would do the following:

1. Press **ALARM** to display the ALARM menu.

```
ALARM
▸ARR/ANCHOR        =ARR      ANCHOR     [OFF]
     ALARM RANGE =0.500NM

 XTE/BORDER        =XTE      BORDER     [OFF]
     ALARM RANGE =0.250NM

 SPEED             =IN     OUT    [OFF]
     UPPER LIMIT   =15.0KTS
     LOWER LIMIT   =11.0KTS
```

Figure 2-18 ALARM menu

2. If the cursor is not on the ARR/ANCHOR line, press [↑] to place it there.
3. Press [←] to select ARRival, if it is not already selected.
4. Press [↓] to select ALARM RANGE.
5. Enter alarm range. To enter 0.05 nautical miles, for example, press **0**, **0**, **5** and **0**.
6. Press **ENT** to terminate keyboard input.

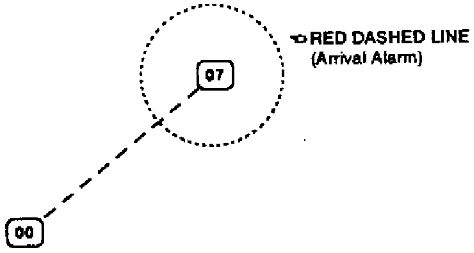


Figure 2-19 Alarm range of arrival alarm

Anchor watch alarm

The anchor watch alarm sounds to warn you that your ship is moving when it should be at rest.

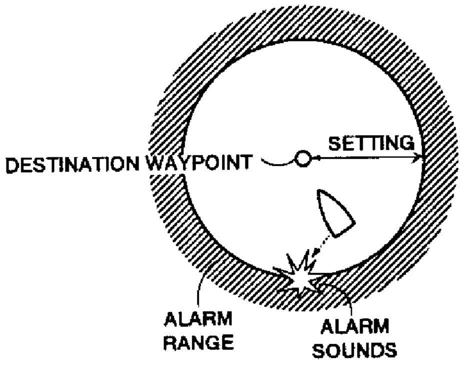


Figure 2-20 How the anchor watch alarm works

1. Press **ALARM** to display the ALARM menu.
2. Operate arrow keys to select ANCHOR.
3. Press [↓] to select ALARM RANGE.
4. Enter alarm range. For example, 0.2 nautical miles; press **0**, **2**, **0** and **0**.
5. Press **ENT**.

XTE alarm

The XTE alarm alerts you when your ship strays from its intended course. You may preset the alarm limit from 0.01 nautical miles to a maximum lane width of 99.99 nautical miles. The off-course alarm will be released when your ship goes out of the lane limits.

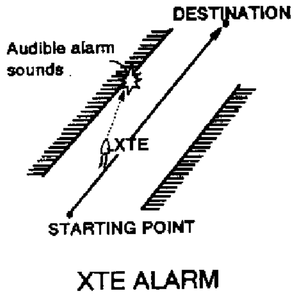


Figure 2-21 How the XTE alarm works

1. Press **ALARM** to display the ALARM menu.
2. Operate arrow keys to select XTE.
3. Press [↓] to advance the cursor to ALARM RANGE.
4. Enter alarm range. To enter 0.02 nautical miles, for example, press **0**, **2**, **0** and **0**.
5. Press **ENT**.

Border alarm

The border alarm defines an area, consisting of two waypoints, which you do not want to cross. The alarm will sound when your ship crosses the area defined by the two waypoints.

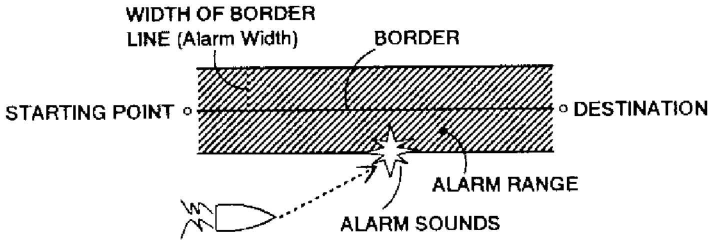


Figure 2-22 How the border alarm works

If you want to set a border alarm between waypoints 77 and 78 (must be preregistered) with an alarm range of 0.3 nautical miles;

1. Press **FR/TO** to display the DESTINATION SETTING menu.
2. Press [↓] to select WPT NO.

```
 MODE     =CURSOR [WAYPOINT] ROUTE
▶WPT NO   =0 0 + 0 - 0 - -
            + - - + - - + - -
```

Figure 2-23 DESTINATION SETTING menu, lower half

3. Press [←] twice.

```
▶WPT NO.  =0 0 + - - + - -
           + - - + - - + - -
```

Figure 2-24 DESTINATION SETTING menu

4. Enter waypoints 77 and 78. Press;

[7] [7] [7] [8] [ENT]

5. Press **ENT**.
6. Press **ALARM** to display the alarm menu.
7. Press arrow keys to select BORDER.
8. Press [↓] to select ALARM RANGE.

8. Enter alarm range. If the alarm range is 0.3 nautical miles for example, press

[0] [3] [0] [0]

9. Press **ENT**.

Ship's speed alarm

The ship's speed alarm sounds when your ship's speed is within or out of the alarm range (depending on which alarm is active) set.

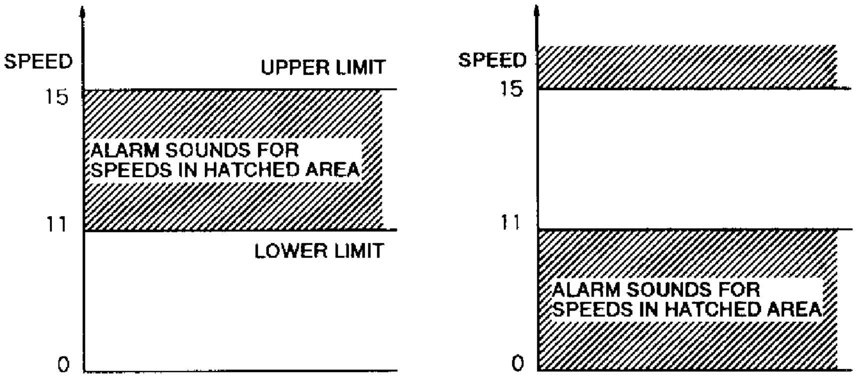


Figure 2-25 How the ship's speed alarm works

The procedure which follows shows how to set a ship's speed alarm.

1. Press **ALARM** to display the ALARM menu.
2. Press [↓] to select SPEED.
3. Press [←]/[→] to select IN or OUT.
4. Press [↓] to advance the cursor to UPPER LIMIT.
5. Enter desired upper limit.
6. Press [↓] to advance the cursor to LOWER LIMIT.
7. Enter desired lower limit.
8. Press **ENT**.

Silencing the audible alarm

When an alarm setting is exceeded, an audible alarm sounds and the speaker icon appears at the bottom right-hand corner of the display. You can silence the audible alarm by pressing **CLR**. The speaker icon remains on the display until the cause of the alarm is removed or the alarm itself is turned off.

What alarm is sounding?

When more than one alarm is active and the alarm sounds, you can see which alarm is sounding by pressing **ALARM**.

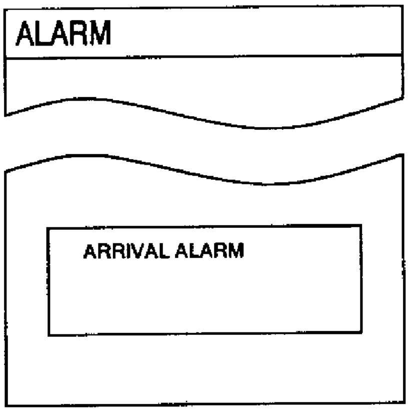


Figure 2-26 ALARM menu, showing location of alarm indication

Lines

A line can be electrically marked on the display to depict a fishing limit line, coastline, small island, danger area, etc. A line is made up of a series of latitude and longitude points: starting, intermediate and end.

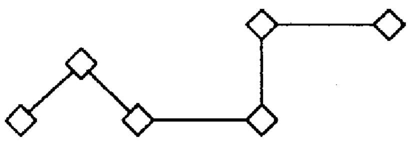


Figure 2-27 Sample line

Entering a line

The procedure below shows how to enter a line with the cursor.

1. Operate the trackball to place the cursor on position desired for starting point of line.
2. Press [◇].
3. Operate the trackball to place the cursor on the position desired for intermediate (or end) point.
4. Press [–◇].
5. To enter another point for the line, repeat steps 3 and 4.

Starting a new line

To add a point to the last entered line you simply designate the location with the cursor and then press [–◇]. To enter a new line, start at step 1 above.

Deleting points on a line

Operate the trackball to set cursor intersection on a triangle mark of the line you want to delete and press **CLR**.

Changing line color

Lines and marks share the same color. If you want to change line color, therefore, press **MARK COLOR** and then select color desired.

Setting Intermediate and Destination Waypoints

Earlier you learned how to set a single destination waypoint. In this section you will learn how to set both a destination waypoint and intermediate waypoints, creating a simple route. As your vessel nears a waypoint on the route, you'll automatically get range and bearing and course information for next intermediate waypoint.

Note that this type of route is cleared when the power is turned off. A little later you will learn how to store a route permanently.

1. Press **FR/TO** to display the DESTINATION SETTING menu.

```
DESTINATION SETTING
▶DEST  = [SET]  CANCEL
 MODE  = [CURSOR]  WAYPOINT  ROUTE  R/B

 SELECT DESTINATION BY USING CURSOR AND
 PRESS ENT.
 INTERMEDIATE POINTS CAN BE SET BY USING + KEY
```

Figure 2-28 DESTINATION SETTING menu

2. Press arrow keys to select CURSOR.
3. Operate the trackball to place cursor intersection on first route point.
4. Press [+]. A green square is inscribed on the display. If you entered wrong location, press [–] to clear entry.
5. Place the cursor intersection on the next point desired.
6. Press [+]. Route points are connected with a solid green line.
7. Repeat steps 5 and 6 to enter another point. You can enter up to 15 points.

(continued)

8. Press **ENT**. Waypoints are marked by a yellow flag and connected by a light-blue dashed line.

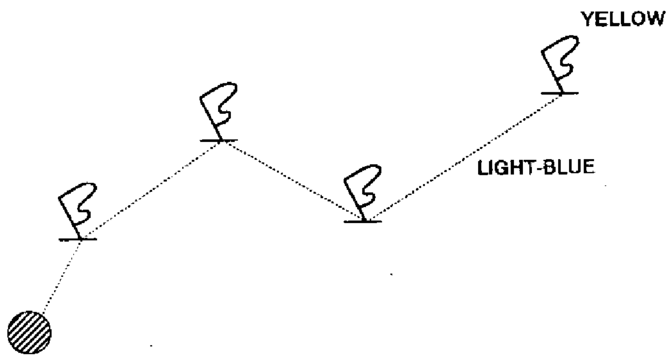


Figure 2-29 Intermediate and destination waypoints on a simple route

Saving Data to a Memory Card

What the memory card can store

You may save data to a memory (RAM) card for storage and later replay. The memory card provides storage for the following.

- Track
- Marks/lines (including user-made charts), and
- Waypoints (including routes).

Storage capacity of memory card

Two types of memory cards are available: 256KB and 512KB.

Formatting a memory card

Before you can save information to a memory card you must prepare its surface by formatting it. Formatting is a routine procedure you must perform on new cards before you can use them with this unit. You have to initialize them only once. You can format cards you've used before, however, in which case all prior information on them is erased.

1. Insert a brand-new memory card into the upper card slot.
2. Press **MENU**.

MENU
1 WAYPOINT 2 ROUTE 3 SAVE DATA TO MEMORY CARD 4 LOAD MEMORY CARD 5 DISPLAY MEMORY CARD 6 CORRECT POSITION 7 APPORTION/DELETE MEMORY 8 INITIAL SETTINGS 9 MISC
SELECT BY USING NUMBER KEY.

Figure 2-30 Menu

3. Press **3** to select SAVE DATA TO MEMORY CARD.

```
3  SAVE DATA TO M.C.

1 TRACK
2 MARK/LINE
3 WAYPOINT/ROUTE
4 INITIAL SETTINGS
5
6
7 DELETE MEMORY CARD DATA
8 FORMAT MEMORY CARD
9 SELECT CARD SLOT

SELECT ITEM TO SAVE
BY USING NUMBER KEY.
```

Figure 2-31 SAVE DATA TO M.C. menu

4. Press **8** to select FORMAT MEMORY CARD.
5. Press **ENT**.

   "FORMATTING" appears on the display during formatting. "FORMATTING COMPLETED" appears upon completion of formatting. If the card could not be formatted, "FORMATTING FAILED" appears.

Saving data

To save data to a memory card;

1. Open the card drive door and place a formatted memory card in the upper card slot.
2. Press **MENU**.
3. Press **3** to select SAVE DATA TO MEMORY CARD.

```
3  SAVE DATA TO M.C.

1 TRACK
2 MARK/LINE
3 WAYPOINT/ROUTE
4 INITIAL SETTINGS
5
6
7 DELETE MEMORY CARD DATA
8 FORMAT MEMORY CARD
9 SELECT CARD SLOT

SELECT ITEM TO SAVE
BY USING NUMBER KEY.
```

Figure 2-32 SAVE DATA TO M.C. menu

4. Select the item you want to save;
   - press **1** for track,
   - **2** for marks, or
   - **3** for waypoints (including routes).

   Then, the menu related to the item selected for saving appears. Figure 2-33 shows the SAVE TRACK display.

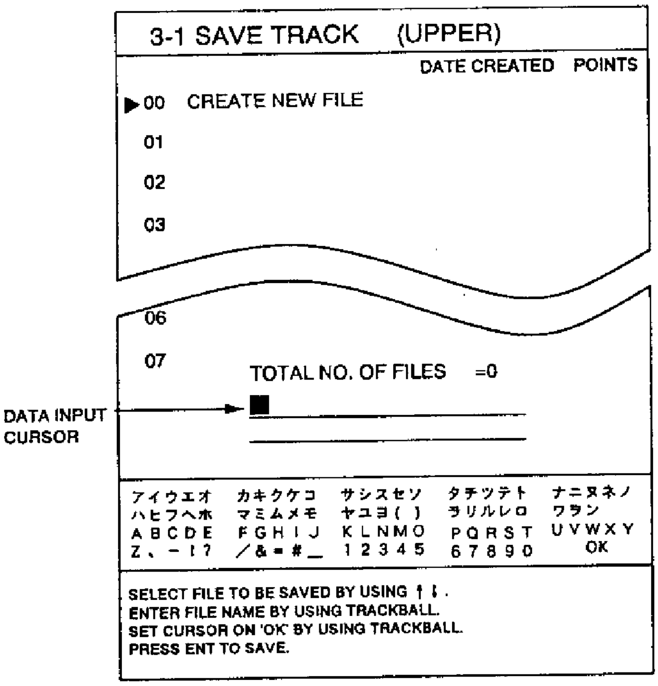
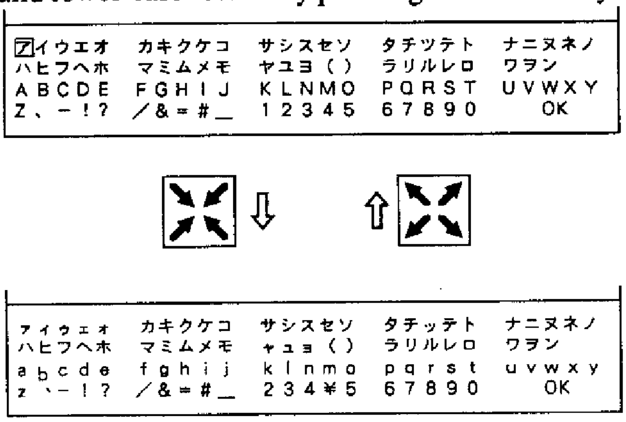


Figure 2-33 SAVE TRACK display

5. The red cursor should be on 00. This will save data to a new file. You may save data to an existing file name, in which case all previous data on that file will be deleted.
6. Assign a file name. The file name may contain up to 32 alphanumeric characters. You can alternate between upper and lower case letters by pressing the **Scale** keys.



(These are lower case characters.)

Figure 2-34 How to select upper and lower case letters

File name example

You enter a file name by

- Selecting each character one by one with the arrow keys and pressing **ENT** after selecting each character.
- When you have finished entering the file name, select OK.

If you want to enter file name "FURUNO 1", for example, follow the procedure below.

- Place the cursor on "F" by operating the trackball.
- Press **ENT**.
- Place the cursor on "U".
- Press **ENT**.
- Enter the characters "R", "U", "N" and "O" and "1" as you did "F" and "U".
- Place the cursor on "OK".

7. Press **ENT**. Then,
   - "SAVING" appears on the display during recording
   - "SAVING COMPLETED" appears upon completion of recording, and
   - the unit returns control to the SAVE DATA TO M.C. (Memory Card) menu.

■ **NOTE:** *The memory card contains a write-protection tab which prevents overwriting of information stored on the card. This prevents accidental erasure of important information. To write protect a memory card, set the write-protection tab rightward as shown in Figure 2-35.*

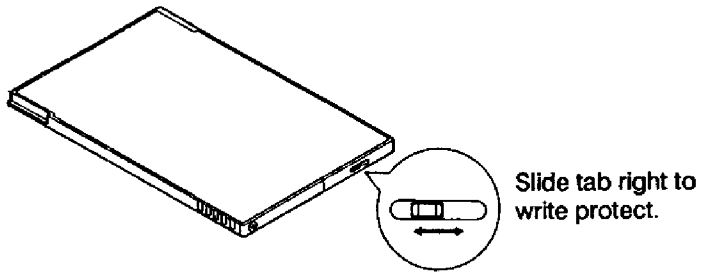


Figure 2-35 How to write protect a memory card

Playing Back Memory Card

Up to eight files can be played back on the display. Note that marks and track currently displayed are not erased; they remain on the display together with played back file. Thus it is recommended that this feature be used only for editing card contents.

1. Insert a memory card into the upper card slot.
2. Press **MENU** to display the menu.
3. Press **5** to select DISPLAY MEMORY CARD.

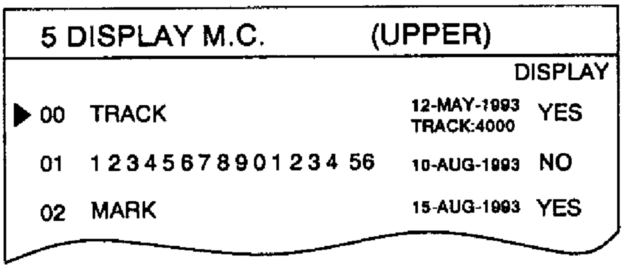


Figure 2-36 DISPLAY M.C. screen

4. Press [↑]/[↓] to place the cursor on the file you want to display.
5. Press [+] to display "DISPLAY YES".

   ■ **NOTE:** *If you select more than eight files to "DISPLAY YES", place cursor on unnecessary file and press [-] to display "DISPLAY NO".*

6. Press **ENT**.
7. Press **PLOT** to return to the plot display.

Changing the Plot Interval

Plot interval

The plot interval determines how the track will be reconstructed on the display and track storage time. The 3100 has two plot intervals which you can set as desired, plot interval 1 and plot interval 2. You can select which one to use by the **PLOT INTVL** key. This section shows you how to preset the plot intervals, on the INITIAL SETTINGS menu.

How the track is drawn

The "quality" of the track displayed largely depends on the plot interval setting, smoothing rate, etc.

In drawing the track, first the ship's position fed from the navigation aid is stored into this unit's memory at an interval of time or distance selected by the operator. This interval of time or distance is called the "Plot Interval" and it is selected considering the ship's speed, the chart scale, etc. If a shorter interval is selected, a reconstructed course line is provided with better accuracy, but total storage time of the track is reduced.

Plot interval and track reconstruction

Obviously there is a trade off between smooth reconstruction of the track and plot storage time: The shorter the interval the smoother the reconstruction but storage time is reduced. Figure 2-37 compares plot interval and track reconstruction.

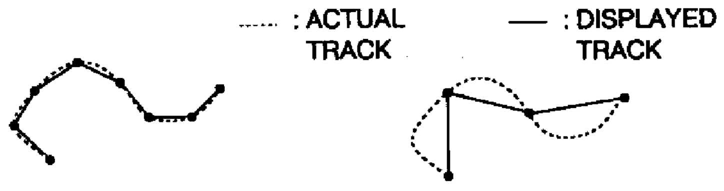


Figure 2-37 Plot interval and track reconstruction

Plot interval by time or distance

The plot interval can be selected by "Time" (00 sec. to 99.59 min.) or "Distance" (00 nm to 9.99 nm). If the plot interval is selected by distance, you will not use up memory points when the boat is anchored.

Setting plot interval 1 by time

The default plot method for plot interval 1 is time. (You can change it to distance.) To set plot interval 1 by time;

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.
3. Press [↑]/[↓] to select PLOT INTERVAL 1.

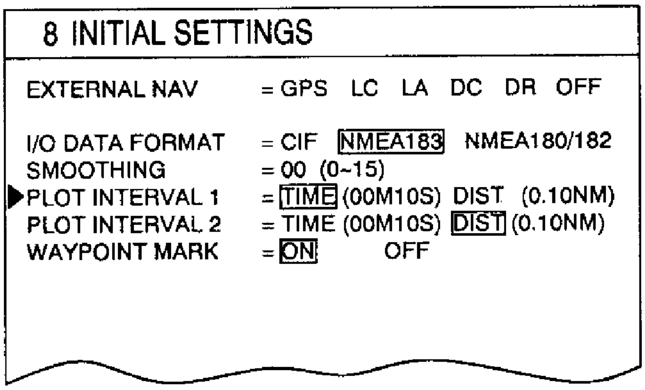


Figure 2-38 INITIAL SETTINGS menu

4. Enter a plot interval. To enter 30 seconds, for example, press **0,0,3** and **0**.
5. Press **ENT**.

Setting plot interval 2 to "time"

The default plot method for PLOT INTERVAL 2 is distance. However, it may be set for time.

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.
3. Press [↑]/[↓] to select PLOT INTERVAL 2.
4. Set option to TIME by pressing [←]/[→].
5. Enter a plot interval. To enter 15 minutes, for example, press **1, 5, 0** and **0**.
6. Press **ENT**.

Displaying Your Ship's Position in Loran TDs

You can display your ship's position and cursor position in Loran A or Loran C TDs, as well as latitude and longitude. This function does not require connection of a Loran receiver; Loran chain information is stored in the unit.

Once Loran A or Loran C chain information is entered you can alternately display Loran A or C TDs (depending on which is selected for display) and latitude and longitude by pressing the **Change** key.

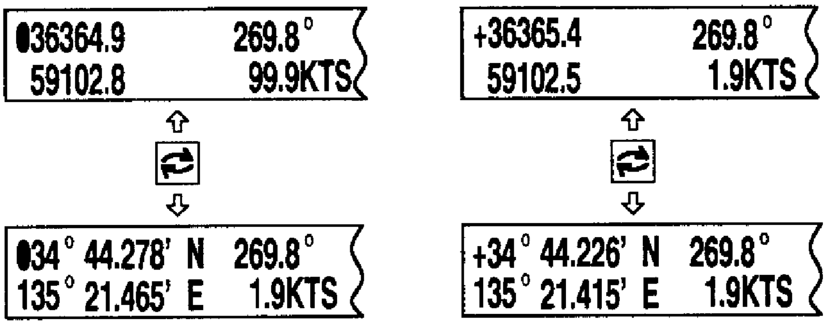


Figure 2-39 How to select Loran TDs or latitude and longitude indications by the **Change** *key*

Loran A TDs

To display ship's position in Loran A TDs;

1. Press **MENU** followed by **8** to display the INITIAL SETTINGS menu.
2. Press [↑]/[↓] to select TD INDICATION.

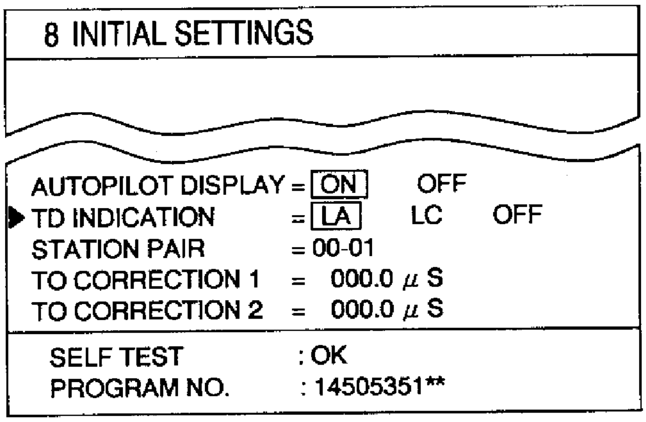


Figure 2-40 INITIAL SETTINGS menu

3. Press [←] to select LA.

4. Press [↓] to select STATION PAIR.
5. Enter station pair code, referring to the station pair code list which follows.

00: 1L0	01: 1L1	02: 1L4	03: 1L5	04: 1L6
05: 1L7	06: 1S1	07: 1S2	08: 1S3	09: 1S4
10: 1S6	11: 2H3	12: 2H4	13: 2H5	14: 2H6
15: 2S0	16: 2S1	17: 2S2	18: 2S3	19: 2S4
20: 2S5	21: 2S6	22: 2S7		

6. Press **ENT**.

Loran C TDs

To display ship's position in Loran C TDs;

1. Press **MENU** followed by **8** to display the INITIAL SETTINGS menu.
2. Press [↑]/[↓] to place the cursor on TD INDICATION.
3. Press [←]/[→] to select LC.
4. Press [↓] to select STATION PAIR.
5. Enter GRI code number, consulting the GRI code number list which follows.

00: 7970	01: 9960	02: 7980	03: 8970
04: 9940	05: 5990	06: 7960	07: 9990
08: 4990	09: 9970	10: 7990	11: 5930
12: 5970	13: 7930	14: 9980	15: 7950
16: 7170	17: 8990	18: 8000	19: 9610
20: 8290			

6. Enter station pair code number, referring to the station pair code number list which follows.

00: 11000	01: 26000	02: 46000:	03: 60000

7. Press **ENT**.

Changing Bearing Display Method

A navigation device outputs both true and magnetic bearings. A magnetic bearing is true bearing plus (or minus) earth's magnetic deviation. Thus the equation for finding magnetic bearing is;

true bearing ±x (magnetic variation)° = magnetic bearing

You can display your ship's course and bearing to waypoint in true or magnetic bearing.

True bearing

To display true bearing;

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.

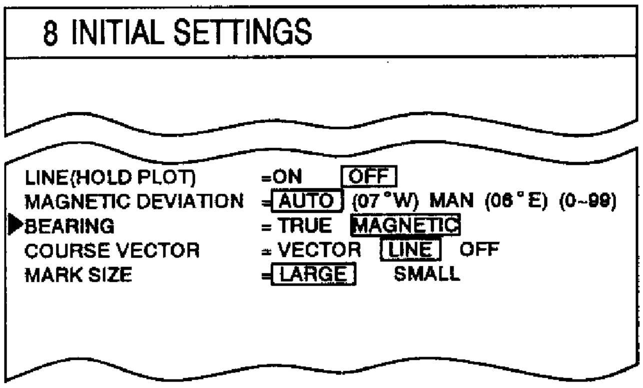


Figure 2-41 INITIAL SETTINGS menu

3. Press [↑]/[↓] to select BEARING.
4. If MAGNETIC is selected, press [←] to select TRUE.
5. Press **ENT**.

Magnetic bearing

To display magnetic bearing;

1. Press **MENU.**
2. Press **8** to select INITIAL SETTINGS.
3. Press [↑]/ [↓] to select BEARING.
4. If TRUE is selected, press [→] to select MAGNETIC.
5. Press **ENT.**

The bearing display in the data window (DATA DISPLAY (2)) shows "M" when you are using magnetic bearing.

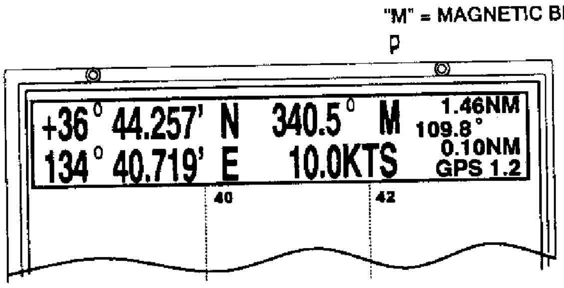


Figure 2-42 Location of magnetic bearing indication on DATA DISPLAY (2)

Entering magnetic variation

The magnetic variations for all areas of the earth are preprogrammed into this unit. The preprogrammed variation is accurate for most instances, however you may wish to manually enter a variation.

The procedure which follows shows how to manually enter magnetic variation.

1. Press **MENU.**
2. Press **8** to select INITIAL SETTINGS.
3. Press [↑]/[↓] to select MAGNETIC VARIATION.
4. If AUTO is selected, press [→] to select MANual.
5. Enter magnetic deviation; magnetic deviation value and plus for east and minus for west. If the magnetic deviation is plus 6°E, for example, press **0**, **6** and [+].
6. Press **ENT.**

Changing Chart Appearance

This section describes how to change chart appearance, for example, change color and brightness of background, turn grid lines on or off, etc.

1. Press **CHART** to display the GEODETIC DATUM menu.

```
GEODETIC DATUM           :
▶LAND DENSITY        = [1]  2   3   4   0 (OFF)
 LAND COLOR          = 1  [2]   3   4   5   6   7
 PLACE-NAME          = [ON]    OFF
 GRID                  [ON]    OFF
 BACKGROUND COLOR= [1]  2   3   4   5   6   7  [8](OFF)
 BACKGROUND BRT      = [HIGH]    LOW
```

Figure 2-43 GEODETIC DATUM menu

2. Selects options desired by operating arrow keys. Table 2-1 describes the GEODETIC DATUM menu.

Table 2-1 GEODETIC DATUM menu description

Menu Item	Function
LAND DENSITY	Select land brightness; 1 for highest 0 for none.
LAND COLOR	Select land color among seven colors.
PLACE-NAME	Turn geographic place-name display on or off.
GRID	Turn grid on or off.
BACKGROUND COLOR	Select background color among seven colors and off.
BACKGROUND BRT	Select background brightness for high or low.

Key Operation Tree

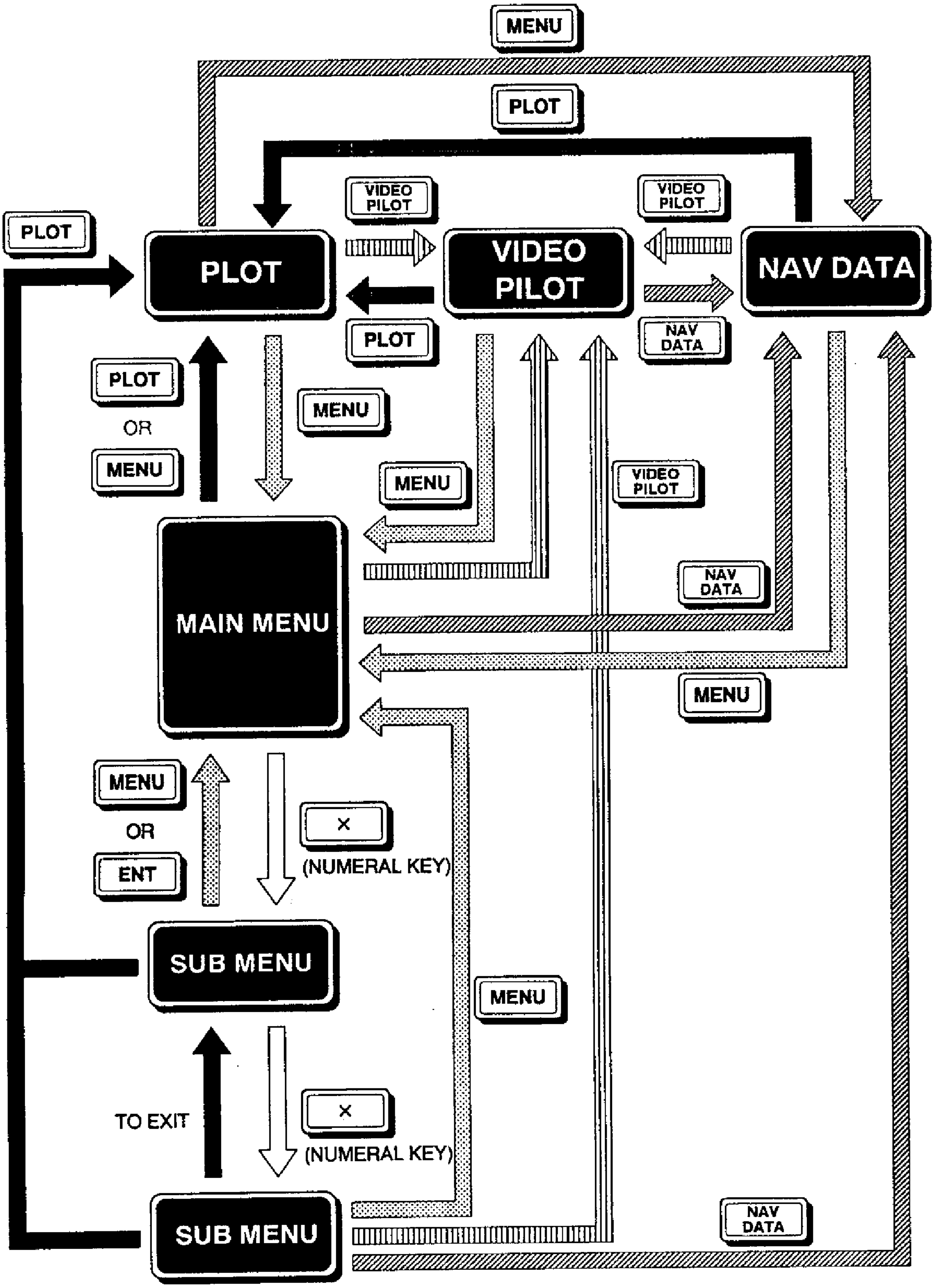


Figure 2-44 Key operation tree

SECTION 2

Video Pilot & Navigation Data Displays

Video Pilot Display

Features

The video pilot display shows navigation information about your destination, using a course-up presentation. To display the video pilot display, press the **VIDEO PILOT** key. Figure 2-45 shows a typical video pilot display.

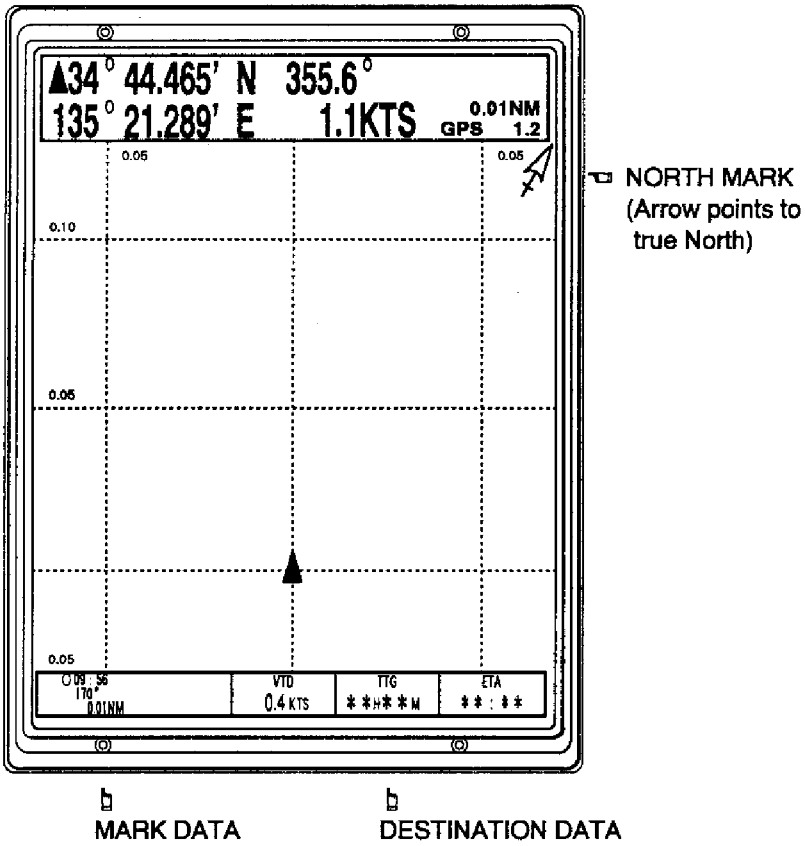


Figure 2-45 Sample video pilot display

Table 2-2 compares the features of the video pilot and plot displays.

Table 2-2 Comparison of video pilot and plot displays

Item	Plot Display	Video Pilot Display
Display Mode	North-up	Course-up
Own Ship Mark	Round	Triangle (depicts ship's bow)
Grid	L/L	Range
North Mark	None	Yes
Destination Data	None	VTD, ETA and TTG
Mark Data	None	Time entered and range and bearing data for last two marks

Destination data

Velocity-To-Destination (VTD)

Velocity to destination is the amount of speed in the direction of the desired destination.

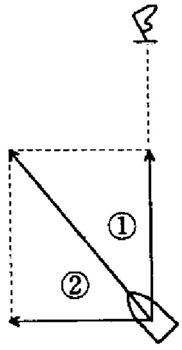


Figure 2-46 VTD

Time-To-Go (TTG)

Time-to-go is the amount of time in hours and/or minutes to arrive at your destination, using present course and speed. If there is no calculation, asterisks are shown.

Estimated Time of Arrival (ETA)

Estimated time of arrival is the time you will arrive to your destination, using present course and speed.

Mark data

The time entered and range and bearing of the last two entered marks are shown. This information remains on the video pilot display (even if those marks are deleted) until new marks are entered. You can turn off the mark data window by pressing **MENU**, **9**, **6**, setting EVENT MARK WINDOW to OFF and pressing **ENT**.

Comparison of plot and video pilot displays

Grid shows latitude and longitude.

Grid shows distance.

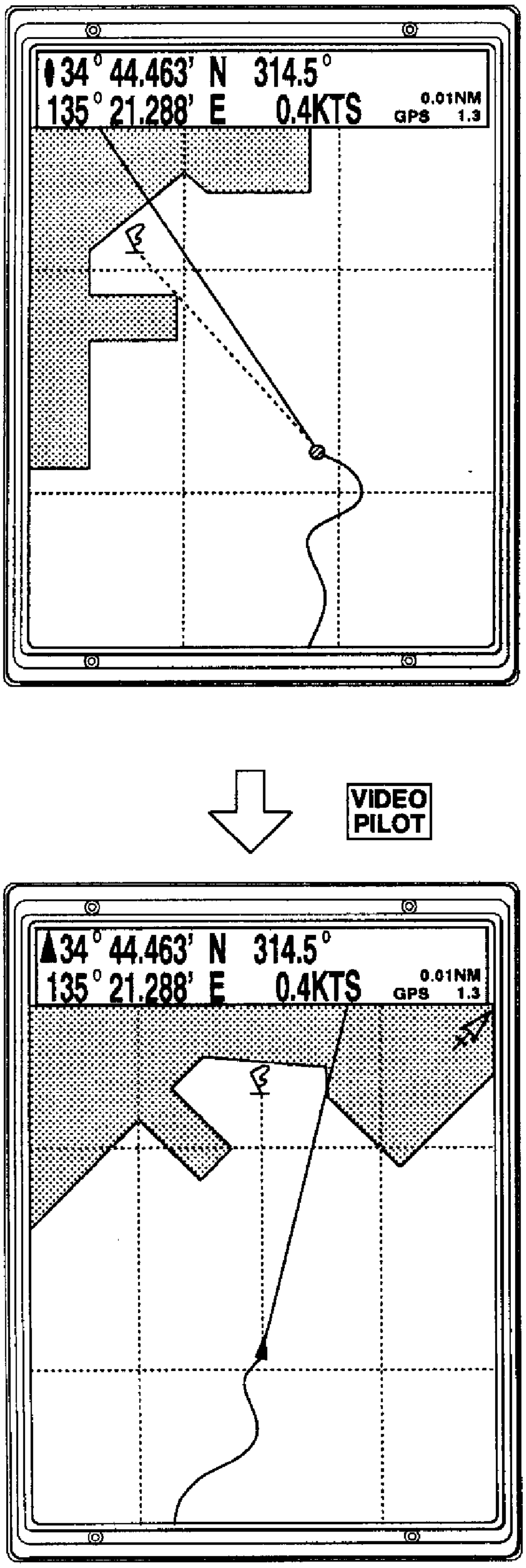
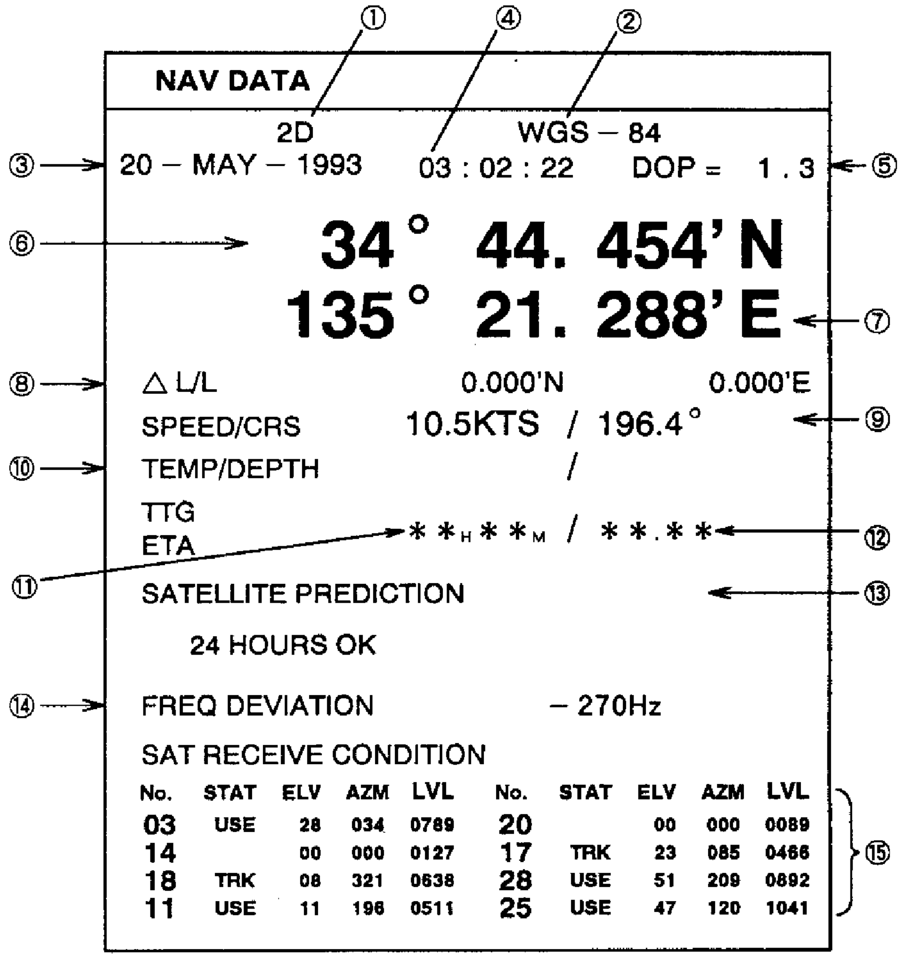


Figure 2-47 Sample plot and video pilot displays

Navigation Data Display

The navigation data display provides various navigation information, input by a navigation aid and sensors. You can display it by pressing the **NAV DATA** key.



① GPS receiver status
② Geodetic chart
③ Date
④ Time
⑤ DOP threshold
⑥ Latitude
⑦ Longitude
⑧ Position correction
⑨ Speed/course
⑩ Water temp/water depth
⑪ TTG to waypoint
⑫ ETA to waypoint
⑬ GPS satellite forecast
⑭ GPS receiver frequency deviation
⑮ Satellite receiving condition

Figure 2-48 Sample navigation data display

ADVANCED LEVEL OPERATION

This chapter describes functions ranging from route navigation to how to clear the memories.

Route Navigation

What is a route?

In many cases a trip from one place to another involves several course changes, requiring a series of route points (waypoints) which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a **route**. This unit can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly. The figure below shows an example of a route between two ports, involving six waypoints.

ROUTE: 01(△△PORT/□□PORT)

Transit Order	Waypoint
1	WPT 06
2	WPT 05
3	WPT 04
4	WPT 03
5	WPT 02
6	WPT 01

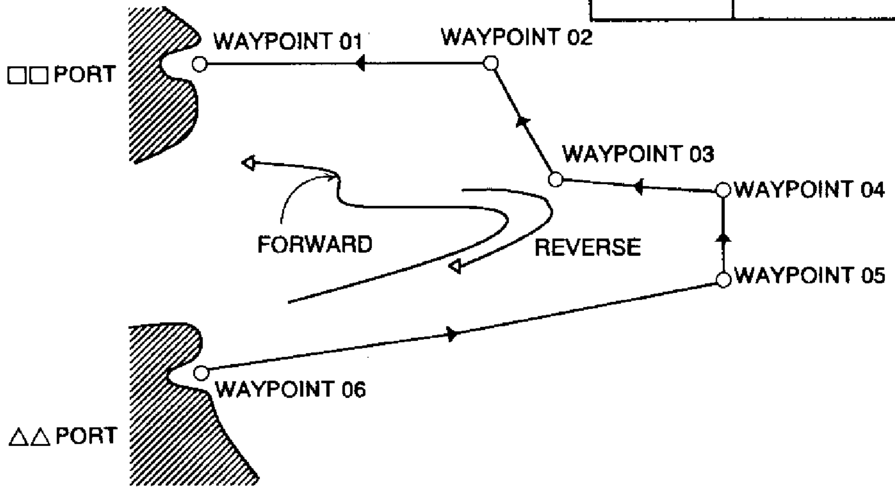


Figure 3-1 Sample route

■ **CAUTION:** *The route planning function is a very useful and beneficial function to have available. However, the ability to switch waypoints automatically during a voyage can lead to some very dangerous situations. The use of any navigational aid requires constant exercise of common sense and caution.*

Route storage capacity

You can store up to 10 routes. A route may contain up to 15 waypoints. The 3100 numbers the routes from 0 to 9. Be sure to record all important routes in a separate log and save them to a memory card. This unit is not a fail-safe record keeping device.

Creating a route

You can create a route four ways:

- through the route list (by latitude and longitude coordinates)
- by previously registered waypoints (two methods), or
- by cursor.

Through the route list

1. Press **MENU**.
2. Press **2** to display the ROUTE list.

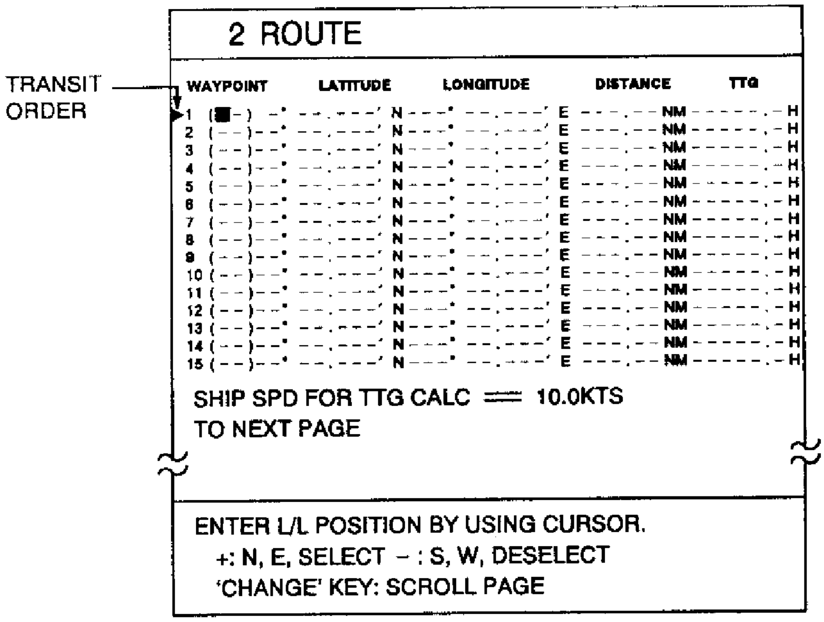


Figure 3-2 ROUTE list

3. Enter latitude and longitude of each route waypoint.
4. Press **ENT**.

By previously registered waypoint (1)

1. Press **MENU**.
2. Press **2** to display the ROUTE list.

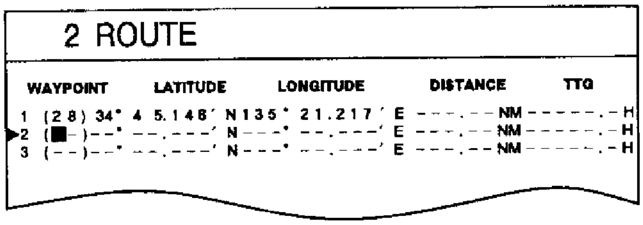


Figure 3-3 ROUTE list

4. Press [←] twice.

5. Enter first waypoint number of route in two digits. If it is 08, for example, press **0** and **8**. The L/L position of the waypoint appears.
6. Press [↓] followed by [←] twice to send the data input cursor to the next line. Enter waypoint number. Its L/L position appears.
7. Repeat step 6 to enter another waypoint.
8. To enter another route, press the **Change** key to scroll page.
9. After entering all information, press **ENT** .

By previously registered waypoint (2)

1. Press **ROUTE** to display the ROUTE NO. menu.

```
ROUTE NO.
▶MODE      = CURSOR  [WAYPOINT]  LIST
 ROUTE NO.= – –
 WPT NO.  =00+– –+– –+– –+– –+– –+– –+– –+
          +– –+– –+– –+– –+– –+– –+– –+– –
---------------------------------------------
 ENTER ROUTE NO., AND SELECT WAYPOINTS,
 PRESSING + KEY AFTER SELECTIONS.
 PRESS ENT TO REGISTER.
```

Figure 3-4 ROUTE NO. menu

2. Operate arrow keys to select WAYPOINT.
3. Press [↓] to select ROUTE NO.
4. Enter route number in two digits. If the route number is 01, for example, press **0** and **1**.
5. Press [↓] to select WPT NO.
6. Enter (previously entered) waypoint numbers.
7. Press **ENT**.

By cursor

1. Press **ROUTE** to display the ROUTE NO. menu.

```
ROUTE NO.
 MODE     = [CURSOR]  WAYPOINT  LIST
▶ROUTE NO.= ■–

---------------------------------------------
 ENTER ROUTE NO., AND SELECT WAYPOINTS,
 PRESSING + KEY AFTER SELECTIONS.
 PRESS ENT TO REGISTER.
```

Figure 3-5 ROUTE NO. menu

2. Enter route number in two digits. (Don't press **ENT** yet.)
3. Operate the trackball to place cursor intersection on L/L position desired for first route waypoint.
4. Press [+]. If you want to cancel a point, press [–].
5. Repeat steps 3 and 4 to enter other points.
6. Press **ENT**. Route waypoints entered by the cursor are marked with a yellow flag and connected with a green dashed line.

Following a route

Following a route is the process by which you use a stored route for navigation. This unit displays navigation information to guide you from one waypoint to the next, as it automatically switches from waypoint to another in sequence.

1. Press **FR/TO** to display the DESTINATION SETTING menu.

```
ROUTE NO.
  DEST       =[SET]  CANCEL
▶MODE       = CURSOR  WAYPOINT  [ROUTE]  R/B
  ROUTE NO.=  – –
  FWD/REV   =[FORWARD]  REVERSE
ENTER ROUTE NO., AND SELECT FOWARD OR REVERSE.
```

Figure 3-6 DESTINATION SETTING menu

2. Press arrow keys to select ROUTE.
3. Press [↓] to select the ROUTE NO. line.
4. Enter route number by two digits.
5. Press [↓] to go to the FWD/REV line.
6. Select route transit direction; forward or reverse.
7. Press **ENT**.

About route navigation

When a route is selected for navigation its waypoints are marked by yellow flags (except waypoint-created routes) and connected with a light-blue dashed line.

The unit will automatically select the first waypoint in the route plan for you to go to towards from your present position. Once you arrive within the radius of the arrival alarm, the unit will automatically switch to the next waypoint in sequence.

You might also try another way to "arrive" at your destination waypoint. This involves changing the arrival alarm range to a

larger number. This way too is fraught with danger, for if you specify the alarm range too loosely, let's say 0.5 nautical miles, you will need to allow the automatic switching to the next destination waypoint to occur, but you may then define a new course to the next waypoint that takes you through a seawall or over land! It is far better to leave a reasonable arrival alarm range of say 0.1 nautical miles, and when you get as close as safely possible to the desired waypoint which is now blocked then manually override the route planning mode and go to manual waypoint sequencing.

■ **NOTE:** *In some instances waypoints on a route may not be connected. If this is the case;*
1) Check setting of ROUTE LINE on menu 96.
2) Try reformatting the display.
3) An intermediate waypoint may be selected by the arrival alarm range. If this is the case, make the alarm range smaller. Note that the arrival alarm range remains in effect in route navigation even when the arrival alarm itself is turned off.

Temporarily deselecting a route waypoint

A route waypoint may be deselected temporarily by entering a "-" (minus) to the left of the route waypoint on the ROUTE list. Using Figure 3-7 as an example, you would want to temporarily deselect route waypoints 04, 05 and 06, since your ship is to traverse the route in the order of route waypoints 03, 02 and 01.

The temporarily deselected route waypoint may be restored at any time by entering a plus sign next to the route waypoint number.

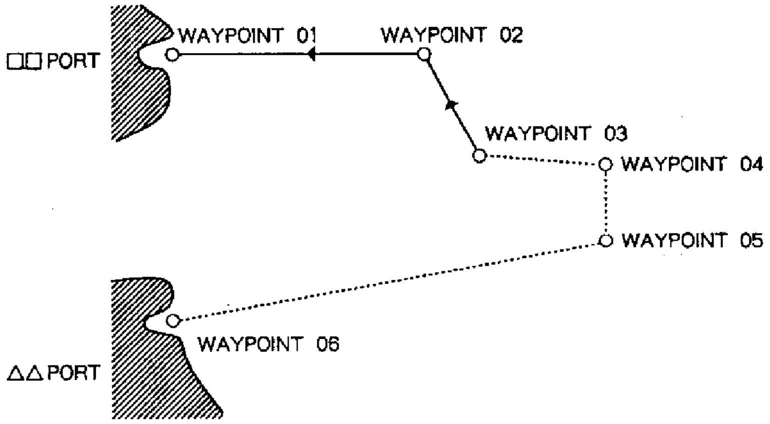


Figure 3-7 Example of when to deselect waypoints

1. Press **MENU**.
2. Press **2** to display the ROUTE list.
3. Press the **Change** key to select route.
4. Press [↑]/ [↓] to place the cursor on the waypoint you want to deselect.

5. Press [←] to place the cursor on a digit in the WAYPOINT column.

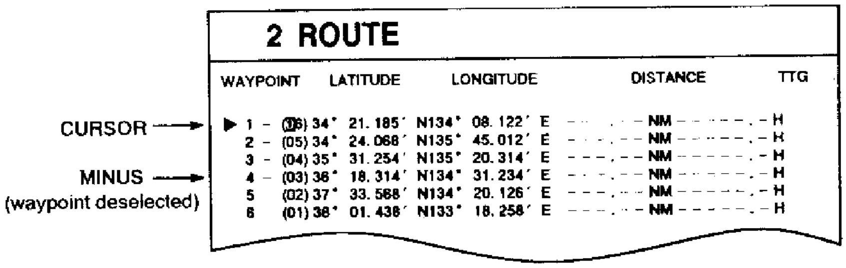


Figure 3-8 ROUTE list

6. Press [–]. In the figure above waypoints 01, 02, 03 and 04 are deselected.

Permanently deleting route waypoints

You can delete all points or specific points on a route.

Specific point

1. Press **MENU** to display the menu.
2. Press **2** to select ROUTE.
3. Select route number by pressing the **Change** key.
4. Place the cursor on route waypoint you want to delete.
5. Press **CLR**. In Figure 3-9, for example, position data for waypoint no. 2 is deleted. The next time you select the route, all route waypoints are automatically renumbered.

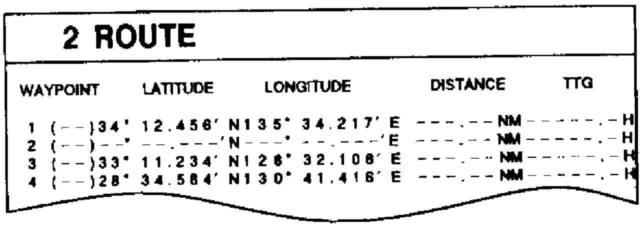


Figure 3-9 ROUTE list, showing deleted waypoint

6. Press **ENT**.

All points

1. Press **ROUTE**.
2. Press arrow keys to select WAYPOINT.
3. Press [↓] to select ROUTE NO.

4. Enter route number.
5. Press [↓] to select WPT NO.
6. Press **CLR** followed by **ENT**.

Cancelling route navigation

You can cancel route navigation by following the procedure below.

1. Press **FR/TO** to display the DESTINATION SETTING menu.
2. Press arrow keys to select CANCEL.
3. Press **ENT**. The color of the line connecting route waypoints changes from light-blue to green, to indicate that route navigation has been cancelled.

Route color and route status

- Route waypoints are connected with a green dashed line when not selected for navigation.
- When a route is selected for navigation, route waypoints are marked by a yellow flag (except waypoint-created routes) and connected by a light-blue dashed line.

Methods of route entry and cancellation

Table 3-1 summarizes the various methods for route entry and cancellation.

Table 3-1 Methods of route entry and cancellation

Create Route	Cancel Route Navigation
Input single destination waypoint by cursor on DESTINATION SETTING menu. (Flag marks destination.)	Cancel on DESTINATION SETTING menu; set DEST SET to CANCEL.
Input several route waypoints and a destination waypoint by [+] key and cursor on DESTINATION SETTING menu. (Each route point is marked by a flag.)	
Input by cursor on ROUTE menu or ROUTE list.	Select route points you want to cancel on ROUTE list and press **CLR**. Be sure to press **ENT** after cancelling unrequired points.

■ **NOTE:** *You cannot erase route waypoints by selecting them by the cursor and pressing* **CLR**.

The External Event Mark

What is the external event mark?

The external event mark shows your ship's position on the 3100 the exact moment the **EVENT** key is pressed on a (external) navigation device connected to the 3100.

Figure 3-10 External event mark (red)

Inscribing an event mark on the 3100

Press the **EVENT** key on the navigation device.

Erasing an external event mark

Place cursor intersection on the mark by operating the trackball and then press **CLR**.

Turning off event mark display

Press **MENU** and **8** and then set EVENT MARK to OFF.

Entering Mark by Latitude and Longitude

An alternative method of entering a mark is by latitude and longitude coordinates, through the REGISTER WAYPOINT menu.

1. Press **WPT** to display the REGISTER WAYPOINT menu.
2. Press arrow keys to select L/L.

```
REGISTER WAYPOINT
▶MODE    = CURSOR [L/L] OS POS.  R/B  LIST
 WPT NO.= – –
 LATITUDE  =  – –°  – – . – – – 'N
 LONGITUDE= – – –°  – – . – – – 'E

ENTER WAYPOINT NO., LATITUDE AND LONGITUDE.
PRESS ENT TO REGISTER WAYPOINT.
   + : N,E, DISPLAY        – : S,W, NOT DISPLAY
```

Figure 3-11 REGISTER WAYPOINT menu

3. Press [↓] twice to advance the cursor to the LATITUDE line, and then enter latitude.
4. Press [↓] to advance the cursor to the LONGITUDE line, and then enter longitude.
5. Press mark key desired.

Deleting All Tracks and Marks

You can clear the memory and display of all tracks and marks/lines. Be sure you do not require those data before deleting them; DELETED DATA CANNOT BE RESTORED.

Deleting all track

To delete all track;

1. Press **MENU**.
2. Press **7** to select APPORTION/DELETE MEMORY.
3. Press **2** to select DELETE TRACK.

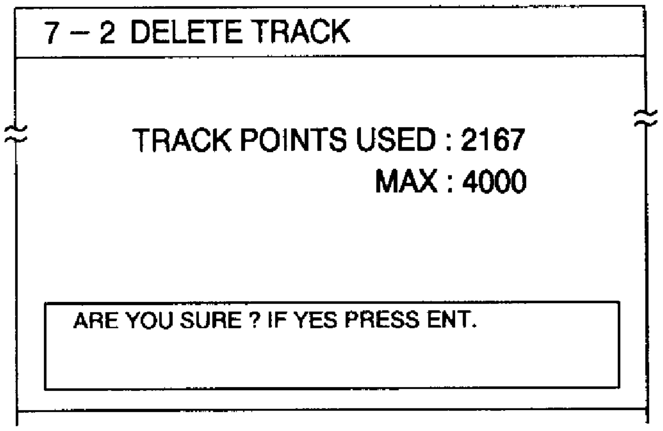


Figure 3-12 DELETE TRACK menu

4. Press **ENT**.

Deleting all marks/lines

To delete all marks/lines;

1. Press **MENU**, **7** and **3** to display the DELETE MARK screen.

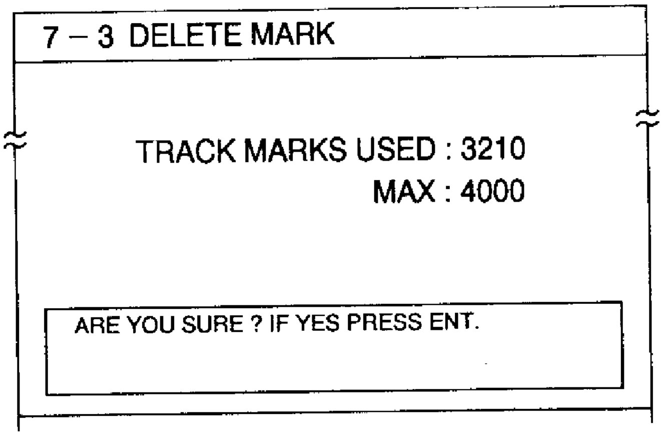


Figure 3-13 DELETE MARK screen

2. Press **ENT**.

Correcting Position

There may be some instances where the chart latitude and longitude position are off by some seconds. You can compensate for this error. If there is ship position error, correct it on the external navigator (GD-3100/GP-3100) or the GPS INITIAL SETTINGS menu (GP-3100 only).

You may correct chart position three ways:

- by cursor
- by latitude and longitude, and
- by Delta L/L

When you apply an offset to chart position the icon shown in Figure 3-14 appears at the bottom right-hand corner on the display.

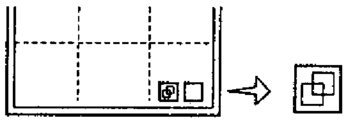


Figure 3-14 Icon shown when chart offset is applied

By cursor

To correct chart position by the cursor;

1. Press **MENU**.
2. Press **6** to select CORRECT POSITION.
3. Operate arrow keys to select YES.
4. Press [↓] to go to the MODE line.
5. Press [←] to select CURSOR.

```
6 CORRECT POSITION

 POS CORR = [YES]   NO
▶MODE     = [CURSOR]   L/L   ΔL/L
 LATITUDE  =  **° **.***'N   (**.***'N)
 LONGITUDE= ***° **.***'E   (**.***'E)

 SET CURSOR ON CORRECT POSITION AND PRESS
 ENT TO DISPLAY ΔL/L.
 PRESS ENT AGAIN TO REGISTER.
```

Figure 3-15 CORRECT POSITION menu

6. Operate the trackball to set cursor on correct latitude and longitude position.
7. Press **ENT** to display ΔL/L.
8. Press **ENT** again to register.

By latitude and longitude

You can correct chart position by manually entering latitude and longitude corrections.

1. Press **MENU.**
2. Press **6** to select CORRECT POSITION.
3. Operate arrow keys to select YES.
4. Operate arrow keys to select L/L.

```
6 CORRECT CHART POSITION
  POS CORR    =[YES]   NO
▶ MODE        = CURSOR  [L/L]   ΔL/L
  LATITUDE    =  --° --.---'N (**.***'N)
  LONGITUDE   = ---° --.---'E (**.***'E)
---------------------------------------------
ENTER CORRECT L/L POSITION THROUGH KEYBOARD
AND PRESS ENT TO DISPLAY ΔL/L.
PRESS ENT AGAIN TO REGISTER.      +: N, E  -: S, W
```

Figure 3-16 CORRECT POSITION menu

5. Enter latitude and longitude corrections on the LATITUDE and LONGITUDE lines.
6. Press **ENT** to display ΔL/L.
7. Press **ENT** again to register.

By Δ (Delta) L/L

Follow the procedure below to correct chart position by Delta L/L.

1. Press **MENU.**
2. Press **6** to select CORRECT POSITION.
3. Operate arrow keys to select YES.
4. Operate arrow keys to select ΔL/L.

```
6 CORRECT POSITION
  POS CORR    =[YES]   NO
▶ MODE        = CURSOR   L/L   [ΔL/L]
  DELTA LAT   =--° --.---'N
  DELTA LONG  =--° --.---'E
---------------------------------------------
ENTER L/L CORRECTION VALUE THROUGH KEYBOARD.

                              +: N, E  -: S, W
```

Figure 3-17 CORRECT POSITION menu

5. Enter latitude and longitude correction values.
6. Press **ENT.**

Cancelling chart position correction

To cancel chart position correction;

1. Press **MENU** and **6**.
2. Operate arrow keys to select NO.
3. Press **ENT**.

Loran TD Correction

When the Loran A or Loran C TD display shows constant error you can compensate for it by doing the following.

1. Press **MENU**.
2. Press **8** to display the INITIAL SETTINGS menu.
3. Press [↑]/[↓] to select TD CORRECTION 1.

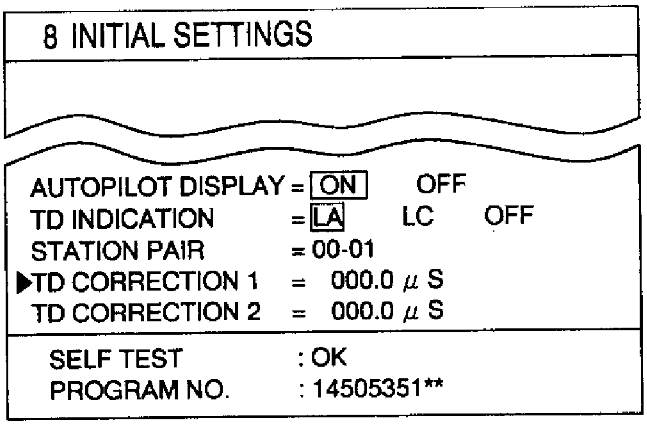


Figure 3-18 INITIAL SETTINGS menu, lower half

4. Enter TD correction value in microseconds. If the value is -0.1 microseconds, for example, press

   [0] [0] [0] [1]

5. Press [↓] to select TD CORRECTION 2 and enter TD correction value in microseconds.
6. Press **ENT**.

Calculating R/B Between Two Points

The 3100 can calculate the range and bearing between any two points. Three methods are available: by latitude and longitude, by cursor, and by waypoint numbers.

By latitude and longitude

To calculate the range and bearing between two latitude and longitude points;

1. Press **MENU**, **9** and **2** to display the CALCULATE RANGE/BEARING menu.
2. Operate arrow keys to select L/L.

```
9 - 2 CALCULATE RANGE/BEARING
▶MODE     = CURSOR [L/L] WAYPOINT
 START PT : --° --.---' N --° --.---' E
 STOP PT  : --° --.---' N --° --.---' E
 RANGE    : ----.-- NM    BEARING: ---.-°     ← CALCULATION RESULTS
--------------------------------------------
 ENTER L/L OF STARTAND STOP POINTS.
 PRESS CLR TO CALCULATE ANOTHER R/B.
```

Figure 3-19 CALCULATE RANGE/BEARING menu

3. Press [↓] to go the START PT line.
4. Enter latitude and longitude of start point.
5. Press [↓] to go the STOP PT line.
6. Enter latitude and longitude of stop point.
7. Press **ENT**. The calculation results appear.

By cursor

You can calculate the range and bearing between two points by using the cursor to designate the two points.

1. Press **MENU**, **9** and **2** to display the CALCULATE RANGE/BEARING menu.
2. Operate arrow keys to select CURSOR.

```
9 - 2 CALCULATE RANGE/BEARING
▶MODE     = [CURSOR] L/L WAYPOINT
 START PT : --° --.---' N --° --.---' E
 STOP PT  : --° --.---' N --° --.---' E
 RANGE    : ----.-- NM    BEARING: ---.-°     ← CALCULATION RESULTS
--------------------------------------------
 SELECT START AND STOP POINTS BY USING CURSOR, PRESSING
 ENT AFTER EACH POINT.
 PRESS CLR TO CALCULATE ANOTHER R/B.
```

Figure 3-20 CALCULATE RANGE/BEARING menu

3. Operate the trackball to select start point and then press **ENT**. A green square marks start point.
4. Operate the trackball to select stop point and then press **ENT**. A solid green line connects start and stop points and the calculation results appear on the menu.

By waypoint numbers

To find the range and bearing between two registered waypoints;

1. Press **MENU**, **9** and **2** to display the CALCULATE RANGE/BEARING menu.
2. Operate arrow keys to select WAYPOINT.

```
9 – 2 CALCULATE RANGE/BEARING

▶ MODE      = CURSOR  L/L  [WAYPOINT]
  START WPT = – –
  STOP WPT  = – –
  RANGE     : – – – – . – – NM    BEARING: – – – . –°     ← CALCULATION RESULTS
-----------------------------------------------------------
  ENTER START AND STOP WAYPOINT NUMBERS.
  PRESS CLR TO CALCULATE ANOTHER R/B.
```

Figure 3-21 CALCULATE RANGE/BEARING menu

3. Enter start and stop waypoints by using arrow keys and numeral keys.
4. Press **ENT**. The calculation results appear on the menu.

Route Calculation

The route calculation function provides distance and time-to-go calculations between each route waypoint.

1. Press **MENU**.
2. Press **2** to select ROUTE.

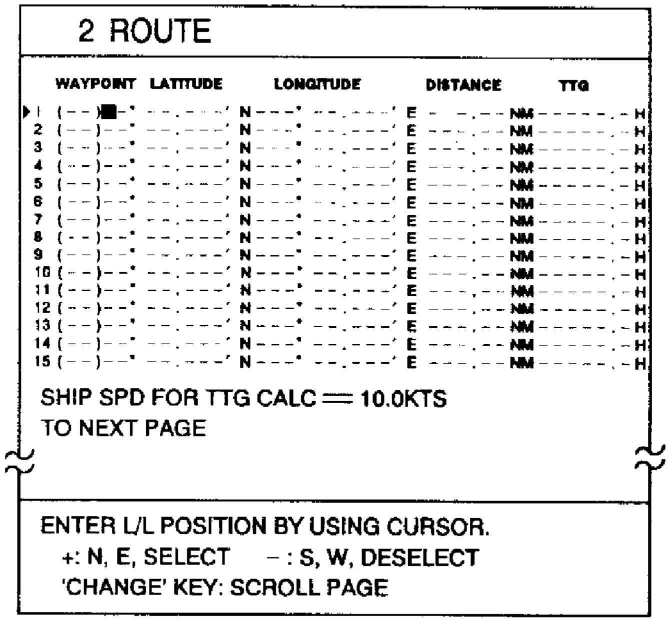


Figure 3-22 ROUTE list

3. Press the **Change** key to select unused route.
4. Enter route waypoints.
5. Press [↓] to advance the cursor to SHIP SPD FOR TTG CALC.
6. Enter ship's speed desired for the calculation. If ship's speed is 15 knots, for example, press **1**, **5** and **0**.
7. Press [↑].

Editing Track and Marks

Editing facilities

The 3100 has the following facilities for editing track and marks:

- delete track and marks
- change appearance of a specific portion of track
- change track and mark color, and
- change mark shape.

The edit track/mark menu

All track and mark editing begins on the EDIT TRACK/MARK menu. This menu is where you select the item to edit, whether you wish to delete or change the item, and the method you wish to use to do the editing.

Basic procedure for editing/deleting

The procedure which follows provides basic operating information for the EDIT TRACK/MARK menu.

1. Press **MENU**, **9** and **1** to display the EDIT TRACK/MARK menu.

```
9 – 1 EDIT TRACK/MARK
▶ITEM  =[CHG TRACK]  DEL TRACK  CHG MARK  DEL MARK
 MODE  =[CURSOR]  BOX  ON SCRN  OFF SCRN
 COLOR =  1  2  3  4  [5]  6  7  8 (SAME)
 TYPE  =[====]  ____  .......  _.__  SAME

SELECT COLOR AND/OR TYPE. SELECT START AND STOP
POINTS BY USING CURSOR, PRESSING ENT AFTER SETTING
EACH POINT.
PRESS ENT AGAIN TO CHANGE TRACK.
```

Figure 3-23 EDIT TRACK/MARK menu

2. Press [↑] to select the ITEM line, if it is not already selected.
3. Press [←]/[→] to select item you want to edit.
   - CHG TRACK: Change track color; change appearance of specific portion of track.
   - DEL TRACK: Delete track.
   - CHG MARK: Change mark color and shape.
   - DEL MARK: Delete mark.
4. Press [↓] to go the MODE line.
5. Press [←]/[→] to select the method you want to use to delete (or change) marks (or tracks).
   - CURSOR: Select the track (mark) you want to edit by the cursor.
   - BOX: Circumscribe the track (marks) you want to edit by a box cursor.
   - ON SCRN: Edit track (marks) displayed on the screen.
   - OFF SCRN: Edit track (marks) stored in memory.

6. Press [↓] to go to the COLOR line.
7. Operate [←]/[→] to select desired new color. For no change, select SAME.
8. Press [↓] to go the TYPE (or SHAPE in case of marks) line.
9. Operate [←]/[→] to select new type (or shape in case of marks). For no change, select SAME.
10. Press **ENT**.

Changing track appearance

To change appearance of track section AB to yellow color dashed line, for example, follow the procedure below.

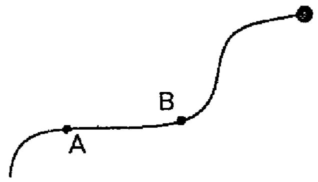


Figure 3-24

1. Press **MENU**, **9** and **1** to display the EDIT TRACK/MARK menu.
2. Press arrow keys to select CHG TRACK on the ITEM line.
3. Press arrow keys to select CURSOR on the MODE line.
4. Press [↓] to go to the COLOR line.
5. Select new color. Using the example above, you would press **2** for yellow.
6. Press [↓] to go the TYPE line.
7. Operate [←]/[→] to select track appearance desired. Using the example, you would select the dashed line.
8. Operate the trackball to place the cursor intersection on point A.
9. Press **ENT**.
10. Operate the trackball to place the cursor intersection on point B.
11. Press **ENT**.
12. Press **ENT** again.

Changing mark shape by box cursor

To change the two circles hatched in Figure 3-25 to purple color "X" marks by using the box cursor, for example, follow the procedure below.

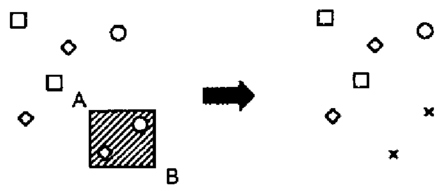


Figure 3-25

1. Press **MENU**, **9** and **1** to display the EDIT TRACK/MARK menu.
2. Press arrow keys to select CHG MARK on the ITEM line.

```
9 - 1 EDIT TRACK/MARK

▶ITEM   =CHG TRACK  DEL TRACK  [CHG MARK]  DEL MARK
 MODE   =CURSOR  [BOX]  ON SCRN  OFF SCRN
 COLOR  =  1  2  3  4  [5]  6  7  8 (SAME)
 SHAPE  =  [◘]  □  ◇  △  ×  ⊞  凸  •  SAME

 SELECT COLOR AND/OR SHAPE. SET BOX SIZE BY USING
 CURSOR, PRESSING ENT AT TWO CORNERS.
 PRESS ENT AGAIN TO CHANGE MARK.
```

Figure 3-26 EDIT TRACK/MARK menu

3. Press arrow keys to select BOX on the MODE line.
4. Press [↓] to go to the COLOR line.
5. Select new color. Using the example above, you would press **5** for purple.
6. Press [↓] to go the SHAPE line.
7. Operate [←]/[→] to select mark desired. Using the example above, select X.
8. Operate the trackball to set the top left-hand corner of the box on point A.
9. Press **ENT**.
10. Operate the trackball to set the bottom right-hand corner of the box on point B.
11. Press **ENT**.
12. Press **ENT** again.

Deleting track by box cursor

This section explains how to delete a portion of track by using the box cursor.

If you want to delete the track between points A and B in Figure 3-27, for example, follow the procedure below.

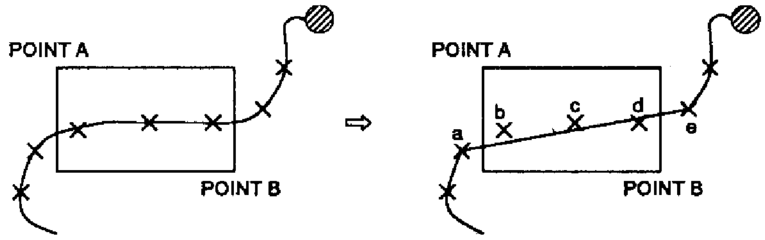


Figure 3-27

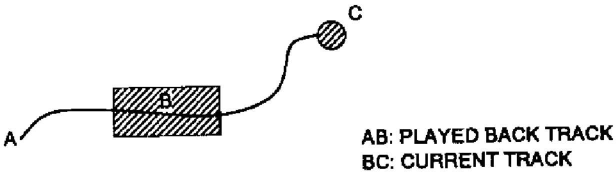
1. Press **MENU**, **9** and **1** to display the EDIT TRACK/MARK menu.
2. Press arrow keys to select DEL TRACK on the ITEM line.

```
9 - 1  EDIT TRACK/MARK

▶ITEM    =CHG TRACK  [DEL TRACK]  CHG MARK   DEL MARK
 MODE    =CURSOR  [BOX]  ON SCRN   OFF SCRN

SET BOX SIZE USING CURSOR, PRESSING ENT AT
TWO CORNERS.
PRESS ENT AGAIN TO DELETE TRACK.
```

Figure 3-28 EDIT TRACK/MARK menu

3. Press arrow keys to select BOX on the MODE line.
4. Operate the trackball to set the top left-hand corner of the box on point A.
5. Press **ENT**.
6. Operate the trackball to set the bottom right-hand corner of the box on point B.
7. Press **ENT**.
8. Press **ENT** again.

■ **NOTE:** *Current track and replayed track cannot be deleted together by using the cursor; use the BOX method.*



Editing the Memory Card

This section explains how to delete and add data to a memory card.

Adding track, marks/lines

You can add track or marks/lines to a memory card by doing the following.

1. Confirm that there is sufficient memory space remaining on the display to load track (or marks/lines) by pressing **MENU**, **7**, **2** (track) or **3** (marks/lines).
2. Press **MENU**.
3. Press **4** to select LOAD MEMORY CARD. The LOAD M.C. menu appears.
4. Select the file you want to load and press **ENT**.
5. Save item loaded by pressing **MENU**, **3** and then entering file name.

Deleting track, marks/lines

To delete track, marks/lines on a memory card;

1. Press **MENU**, **9**, **8** and **1** to clear the display.
2. Press **MENU**.
3. Press **4** to select LOAD MEMORY CARD.
4. Select item to load.
5. Press **MENU**, **9** and **1** and then delete the item you do not require.
6. Save item desired by pressing **MENU** and **3** and then assigning a file name.

Deleting a file

To delete an entire file;

1. Press **MENU**.
2. Press **3** to select SAVE DATA TO MEMORY CARD.
3. Press **7** to select DELETE MEMORY CARD DATA.
4. Press [↑]/[↓] to select file you wish to delete.
5. Press [+] and **ENT**.

■ **NOTE 1:** *The entire contents of a card can be deleted by formatting the card.*

■ **NOTE 2:** *Card copy software (GD-3090) is optionally available.*

Customizing the PLOT INTVL Key

This section shows you how to customize the **PLOT INTVL** key to suit your needs. Each time you press the **PLOT INTVL** key, in the default setting, a plot interval is selected (plot interval 1 or plot interval 2) or recording of the track is turned off. If you do not need one of the plot intervals or you would like to reserve one of them for manual entry of plot interval, follow the procedures below.

Setup for manually entering plot interval

To enable manual entry of plot interval by the **PLOT INTVL** key;

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.
3. Press [↑]/[↓] to select PLOT INTERVAL 1 or PLOT INTERVAL 2, whichever you want to use to manually enter plot interval.
4. Press [←]/[→] to select TIME or DISTance.
5. Press **CLR** followed by **ENT**. Then, to manually enter plot interval, press **PLOT INTVL** to select PLOT INTERVAL chosen in step 3, enter plot interval and then press **ENT**.

```
PLOT INTERVAL SETTING BY DISTANCE
▶ PLOT INTERVAL      = -- MIN -- SEC
```

Figure 3-29 PLOT INTERVAL menu

Turning off a plot interval

To turn off a plot interval;

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.
3. Press [↑]/[↓] to select PLOT INTERVAL 1 or PLOT INTERVAL 2, whichever you want to turn off.
4. Press [←]/[→] to select TIME or DISTance.
5. Press the **0** key four times followed by **ENT**. Then, when you press **PLOT INTVL** the plot interval selected above is skipped.

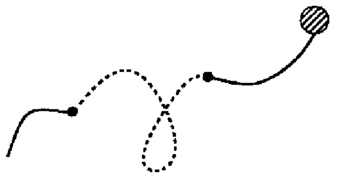
Customizing the Track Hold Function

Earlier you learned how to stop recording the track (track hold function) to conserve memory space. This section explains how to customize the track hold function as you like.

Turning off track display during track hold

When you stop recording the track, in the default setting, the track is displayed but not recorded. If you do not want to show this portion of the track, you can turn it off by following the procedure below.

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.
3. Press arrow keys to select OFF on the TRACK (HOLD PLOT) line.
4. Press **ENT**.



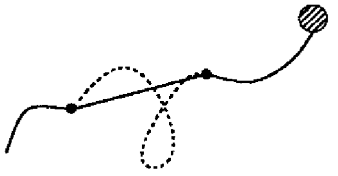
Line (hold plot) off

Figure 3-30 Appearance of track when track during track hold is not displayed

Connecting track after restarting track recording

In the default setting, the points on the track where recording is stopped and restarted are not connected when recording is restarted. If you want to connect those points do the following.

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.
3. Press arrow keys to select ON on LINE (HOLD PLOT).
4. Press **ENT**.



Line (hold plot) on

Figure 3-31 Line connects track (not recorded) after track hold is released

Locking Preferred Settings

The 3100 provides various methods for entering and selecting destination waypoint, waypoint and other items. Once you find the method you prefer you may want to have it selected for you automatically. This section shows how to do this.

When you lock settings the following functions are not available.

- Selection of method to enter waypoint, destination waypoint, route, and perform range and bearing calculation
- Chart correction (menu 6)
- Memory apportion (menu 7)
- Initial settings (menu 8)
- Self test (menu 99)

Locking or unlocking preferred settings

While pressing and holding down **MENU**, turn on the power. Release **MENU** when the plot display (or video pilot display) appears.

Memory Capacity

The default memory apportion is as shown in Figure 3-32.

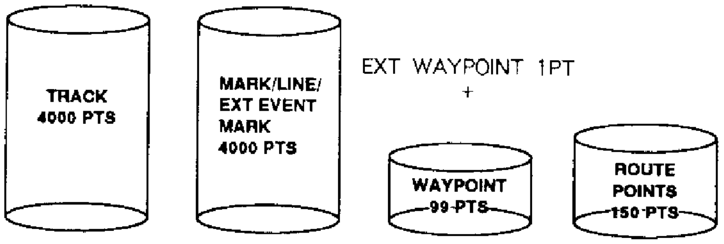


Figure 3-32 Default memory apportion

The track and memory capacity includes current or loaded track and current or loaded marks.

- Current track: position input by navigator
- Current mark: mark input through keyboard
- Loaded track/mark: track/mark loaded from a memory card

■ **NOTE:** *Waypoints loaded from a memory card are erased if they share the same waypoint numbers as current waypoints.*

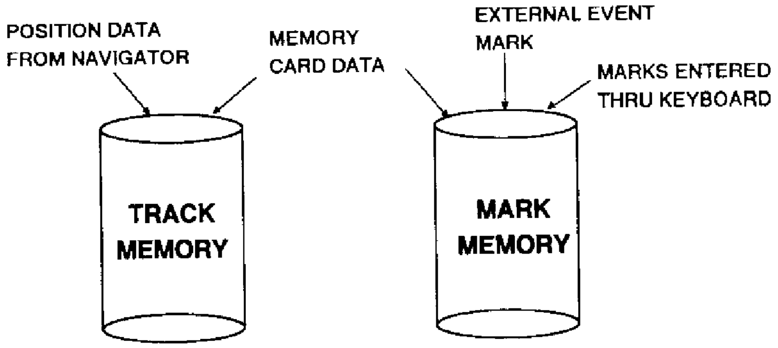


Figure 3-33 Contents of track and mark memories

Track memory

When the track memory becomes full oldest track is deleted.

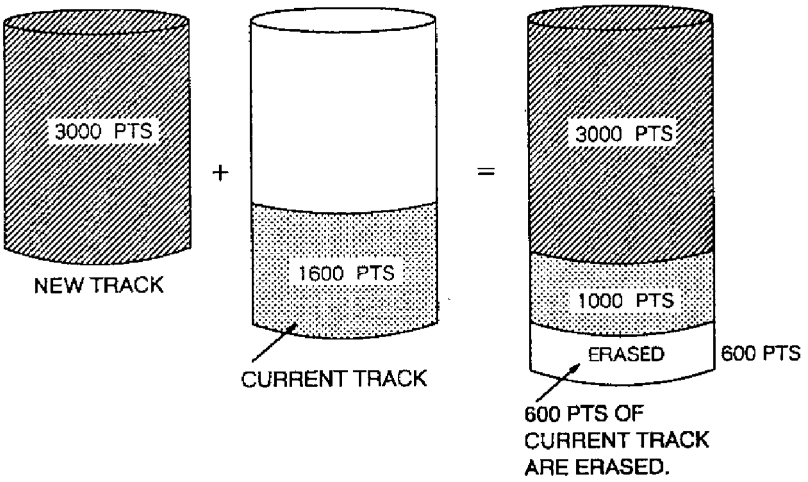


Figure 3-34 What happens when the track memory is full and new track is input

Mark/line memory

When the mark memory becomes full no marks can be entered.

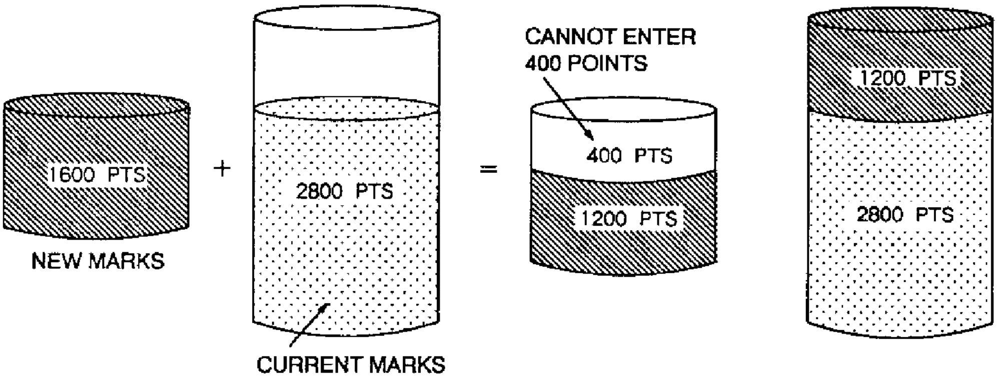


Figure 3-35 What happens when the mark memory is full and new marks are entered through the keyboard

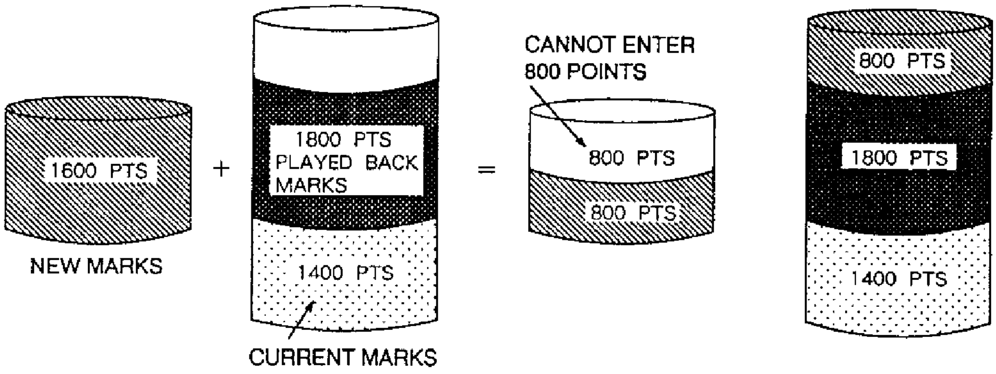


Figure 3-36 What happens when the mark memory is full and marks are added to existing and loaded marks

Apportioning the Memory

The default memory apportion is 4,000 points each of tracks and marks. However, you may change that setting to suit your operating needs.

If you want the memory apportion to be 5,000 points of track and 3,000 points of marks, for example, follow the procedure below.

■ **NOTE:** *All track and marks are erased when the memory is reapportioned.*

1. Press **MENU**.
2. Press **7** to select APPORTION/DELETE MEMORY.
3. Press **1** to select APPORTION MEMORY.

7 – 1 APPORTION MEMORY

TRACK MEM.=4000 PTS(MAX 8000PTS)

CURRENT APPORTION
TRACK : 4000 PTS
MARK : 4000 PTS

MEMORY APPORTION
CHANGE DELETE
TRACKS AND ALL MARKS.

ENTER DESIRED MAXIMUM NO. OF TRACK POINTS.
MAXIMUM NO. OF MARKS = 8000 – MAXIMUM NO. OF TRACK POINTS.
CHANGING MEMORY APPORTION DELETES ALL EXISTING TRACKS AND MARKS.

Figure 3-37 APPORTION MEMORY screen

4. Enter number of memory points desired for track. If you want the track capacity to be 5,000 points, press **5** and then press 0 three times.
5. Press **ENT**, [+] and **ENT**.

Reading Number of Memory Points Used

Track

To know the number of track points you have used;

1. Press **MENU**.
2. Press **7** to select APPORTION/DELETE MEMORY.
3. Press **2** to select DELETE TRACK.

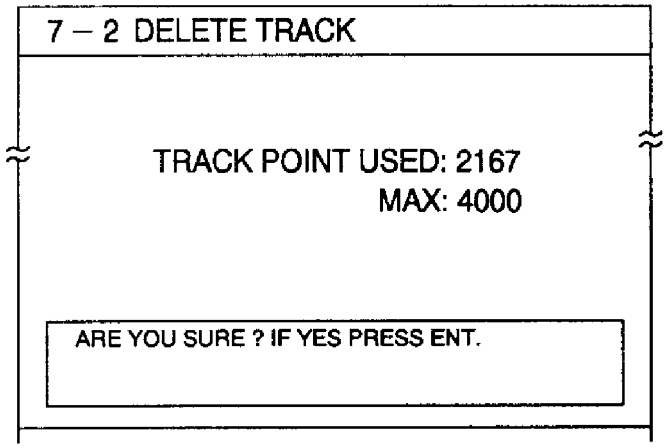


Figure 3-38 DELETE TRACK screen

The display shows number of points used/track memory capacity. In Figure 3-38, for example, 2,167 points of track have been used out of 4,000.

4. Press **PLOT** to return to the plot display.

Marks/lines

Follow the procedure above except press **3** at step 3 to select DELETE MARK.

Smoothing

In Figure 3-39, the actual ship's track is shown by a wide hatched arrow and the position being fed from the navigational aid is shown by black dots. If smoothing is selected to "0 (off)," the track shown on the display will be a irregular track plotting (solid line) due to signal variations. To smooth this track, the "Weight Factor" given to new position data compared to previous fixes should be changed.

For instance, number 03 provides a weighting factor of 13/16 for new data and 3/16 for previous data. The higher the smoothing number, the slower the position updating becomes. In the figure below, the track shown by the broken line has a time delay more than the one shown by the dot-dash line, because of higher smoothing rate.

To enter a smoothing rate of 03, for example;

1. Press **MENU** and **8**.
2. Press [↑]/[↓] to select L/L SMOOTHING.
3. Press **0** and **3** to enter smoothing rate of 3.
4. Press **ENT**.

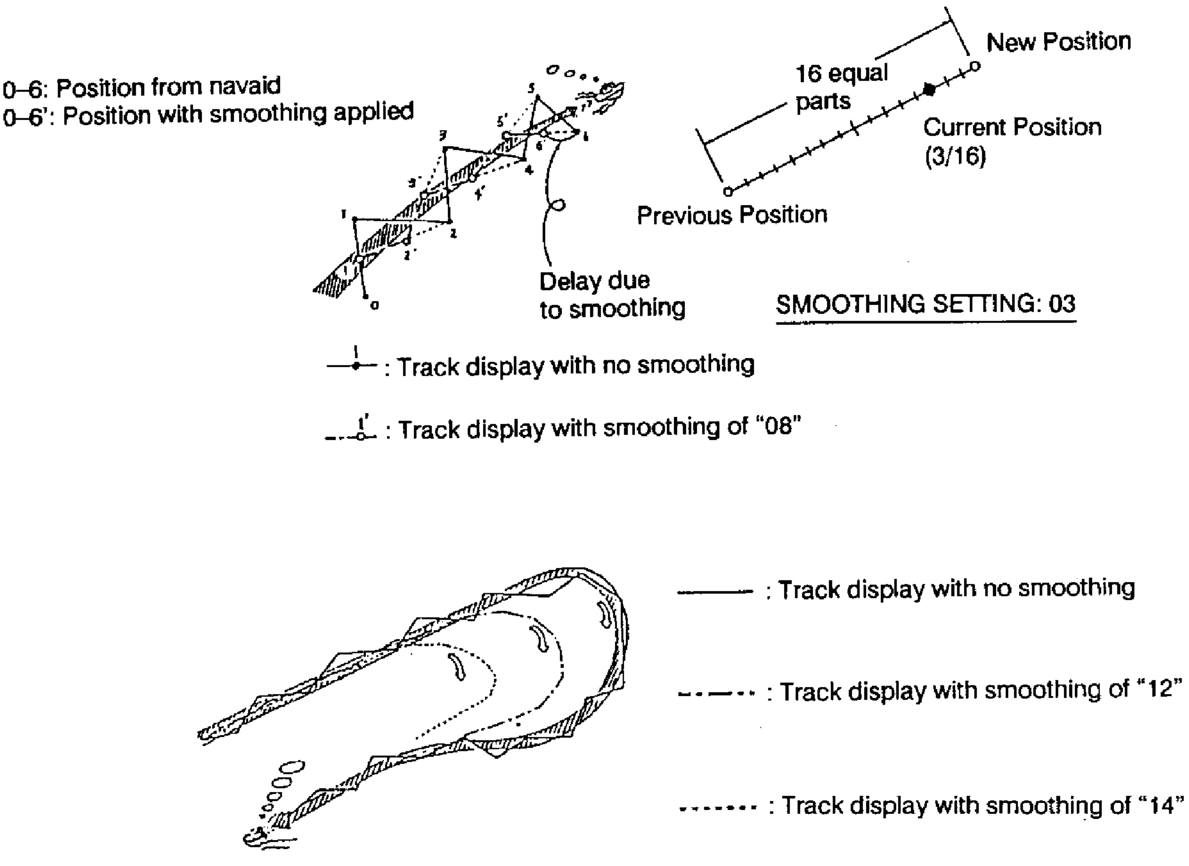


Figure 3-39 Smoothing

Selecting Navaid

Navigation data can be fed from the internal GPS receiver (GP-3100 only) or external navigator. The default navaid setting for the GP-3100 is the internal GPS receiver.

To select an external navaid;

1. Press **MENU** and **8** to display the INITIAL SETTINGS menu.

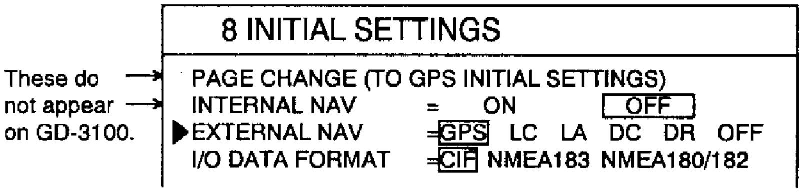


Figure 3-40 INITIAL SETTINGS menu, first three items

2. Operate arrow keys to select OFF on the INTERNAL NAV line.
3. Press [↓] to go to the EXTERNAL NAV line.
4. Press [←]/[→] to select desired navigator;

   LC, Loran C; LA, Loran A; DC, Decca; DR, Dead Reckoning
5. Press **ENT**.

■ **NOTE:** *If both internal and external GPS receivers are selected on the GP-3100 position data from the internal receiver is used to fix position.*

User Definable Items

The INITIAL SETTINGS menu (menu 8) and SPECIAL menu (menu 96) contain display-related items which you change the size or shape or turn on or off as desired.

Initial settings menu

The figure below shows the items on the INITIAL SETTINGS menu which you can change their attributes.

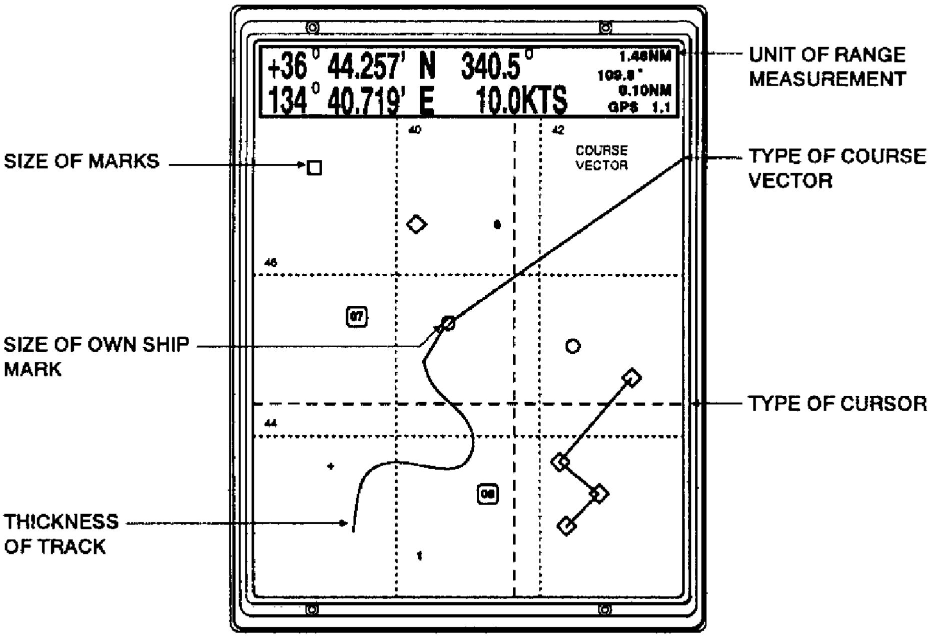


Figure 3-41 Items whose attributes you can change on the INITIAL SETTINGS menu

These do not appear on GD-3100. → PAGE CHANGE (TO GPS INITIAL SETTINGS), INTERNAL NAV

```
8 INITIAL SETTINGS
 PAGE CHANGE (TO GPS INITIAL SETTINGS)
▶INTERNAL NAV         = ON        OFF
 EXTERNAL NAV         = GPS  LC  LA  DC  DR  OFF
 I/O DATA FORMAT      = CIF       NMEA183  NMEA180/182
 SMOOTHING            = 00(0~15)
 PLOT INTERVAL 1      = TIME (00M10S)  DIST  (0.10NM)
 PLOT INTERVAL 2      = TIME (00M10S)  DIST  (0.10NM)
 WAYPOINT MARK        = ON        OFF
 EVENT MARK           = ON        OFF
 TRACK(HOLD PLOT)     = ON        OFF
 LINE(HOLD PLOT)      = ON        OFF
 MAGNETIC DEVIATION= AUTO (07° W) MAN (06° E) (0~99)
 BEARING              = TRUE   MAGNETIC
 COURSE VECTOR        = VECTOR   LINE   OFF
 MARK SIZE            = LARGE    SMALL
 CURSOR SIZE          = LARGE    SMALL
 OWN SHIP MARK        = LARGE    SMALL
 TRACK WIDTH          = THICK    THIN
 RANGE UNIT           = NM       Km       SM
 VTD AVG TIME         = 10MIN
 DATE                 = 1992-04-10         (YYYY-MM-DD)
 TIME                 = 10:01:50
 EXTERNAL CLOCK       = ON      OFF
 AUTOPILOT DISPLAY    = ON      OFF
 TD INDICATION        = LA    LC    OFF

SELF TEST        : OK
PROGRAM NO.      : 14505351 * *
```

Figure 3-42 INITIAL SETTINGS menu

Special menu

The SPECIAL menu also contains display screen-related items which you can turn on or off.

```
9 - 6 SPECIAL
▶TIME MARK            =ON   OFF
 EVENT MARK WINDOW    =ON   OFF
 ROUTE LINE           =ON   OFF
 SCREEN SCALE         =DISTANCE   SCALE
 AD DATA FORMAT       =NMEA-183 NMEA-180S
```

Figure 3-43 SPECIAL menu

The tables on the next page explain the display screen-related items on the INITIAL SETTINGS and SPECIAL menus.

Table 3-2 User-definable items on INITIAL SETTINGS menu

Item	Function
WAYPOINT MARK	Globally turn the waypoint mark display on or off.
EVENT MARK	Globally turn the event mark display on or off.
COURSE VECTOR	Select course vector display method; vector, line or none (off).
MARK SIZE	Select mark size for large or small.
CURSOR SIZE	Select cursor size for large or small.
OWN SHIP MARK	Select own ship mark for large or small.
TRACK WIDTH	Select track width for thick or thin.
RANGE UNIT	Display range in either nautical miles, kilometers, or statute miles.
VTD AVG TIME	Change averaging time for ship's speed used in ETA calculation.
EXTERNAL CLOCK	Reset internal clock on the hour by external navigator's clock.

Table 3-3 User-definable items on SPECIAL menu

Item	Function
TIME MARK	Turn the time mark on or off.
EVENT MARK WINDOW	Turn mark data window on or off on video pilot display.
ROUTE LINE	Disconnect or connect waypoints on a route.
SCREEN SCALE	Select display screen scale for distance or scale.
AP DATA FORMAT	Select autopilot data format; NMEA 0183 or NMEA 0180S.

Saving and Playing Back Initial Settings

You can save the contents of the INITIAL SETTINGS menu to a memory card and play them back when desired; for example, after clearing all memories. In addition, you could store several different sets of initial settings and use them according to situation.

Saving

You can save initial settings to a memory card by doing the following.

1. Open the card drive door and insert a memory card into the upper card slot.
2. Press **MENU** and **3** to display the SAVE DATA TO MEMORY CARD menu.
3. Press **4** to select INITIAL SETTINGS.
4. Press **ENT**. (No need to enter file name.)

Playing back

To play back initial settings;

1. Open the card drive door and insert the memory card which contains the initial settings you want to play back into the upper card slot.
2. Press **MENU** and **4** to display the LOAD DATA TO MEMORY CARD menu.
3. Press **4** to select INITIAL SETTINGS.
4. Press **ENT**.

Clearing Memories

The 3100 has the following memories:

- **Display screen data** consisting of tracks, marks, waypoints and routes
- **GD data** consisting of display screen data plus modes of registration, alarm settings and initial setting, and
- **GPS data** consisting of GPS initial settings (GP-3100) and the Almanac.

These memories can be cleared to start fresh operation. When you clear a memory the unit automatically restores default settings for that memory.

Clearing display screen data

Press **MENU**, **9**, **8**, **1** and **ENT**.

Clearing GD data

To clear GD data;

1. Press **MENU**.

```
MENU
1 WAYPOINT
2 ROUTE
3 SAVE DATA TO MEMORY CARD
4 LOAD MEMORY CARD
5 DISPLAY MEMORY CARD
6 CORRECT POSITION
7 APPORTION/DELETE MEMORY
8 INITIAL SETTINGS
9 MISC
SELECT BY USING NUMBER KEY.
```

Figure 3-44 MENU

2. Press **9** to select MISC.

```
9 MISC
1 EDIT TRACK/MARK
2 CALCULATE RANGE/BEARING
3
4
5
6 SPECIAL
7 SELECT MARKS/CONTOUR LINES
8 CLEAR MEMORY
9 SELF TEST
SELECT NUMBER.
```

Figure 3-45 MISC menu

3. Press **8** to select CLEAR MEMORY.

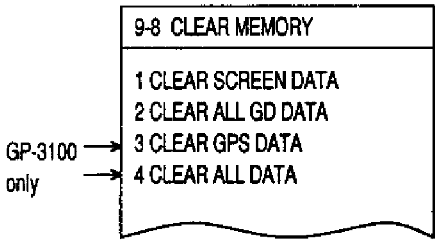


Figure 3-46 CLEAR MEMORY menu

4. Press **2** to select CLEAR ALL GD DATA.
5. Press **ENT**.

Clearing GPS data (GP-3100)

When you clear GPS data all GPS initial settings and the Almanac are cleared. The GPS receiver starts afresh in the cold start condition.

Keying sequence: **MENU**, **9**, **8**, **3** and **ENT**

Clearing all data (GP-3100)

GD data and GPS data can be cleared together.

Keying sequence: **MENU**, **9**, **8**, **4** and **ENT**

GPS RECEIVER OPERATION (GP-3100)

This chapter describes the GPS (Global Positioning System) and how to operate the GPS receiver.

How GPS Works

The GPS system

GPS is an acronym meaning Global Positioning System. GPS (sometimes referred to as NAVSTAR) is a highly precise satellite navigation system developed by the U.S. Department of Defense.

When full global coverage becomes available, a constellation of 24 satellites (including three spares) emplaced in nearly 20,000-kilometer high 12-hour circular orbits will provide highly precise, continuous, worldwide, all-weather position plus time and velocity information to GPS receiver-equipped vehicles, vessels and aircraft.

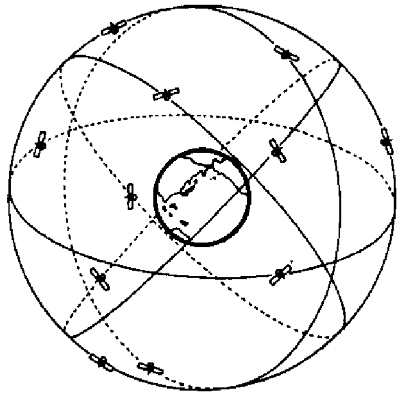


Figure 4-1 The orbits of GPS satellites

How the GPS receiver fixes its position

The GPS receiver continuously fixes its position by receiving three (or four) satellites within line-of-sight. The basic steps in position fixing are as below.

1. GPS satellites continually transmit their own precise orbital data called ephemeris. The GPS receiver computes satellites' position by this data.
2. The GPS receiver measures very accurate distances to the satellites.
3. Satellite location and their distances from the GPS receiver are known. The GPS receiver fixes its own position by triangulation.

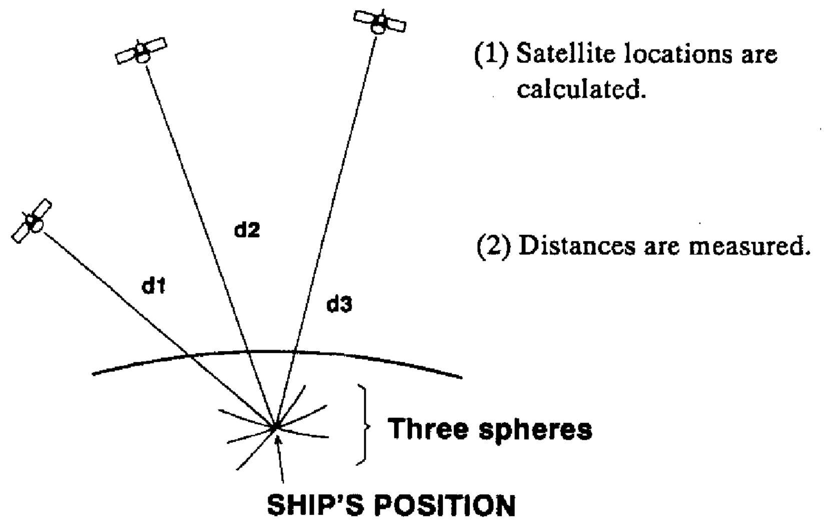


Figure 4-2 How the GPS receiver finds its position

Position-fixing accuracy

In radar position-fixing, most accurate position fixes are obtained when the targets used are spaced nearly 90 degrees from each other. Similarly, GPS position-fixing accuracy is subject to satellite location. Generally, the further apart the satellites are from one another, the greater the position-fixing accuracy.

For example, take a look at the two illustrations in Figure 4-3. In both illustrations a fix is obtainable in the Northern Pacific region because three satellites are in line-of-sight. However, position-fixing accuracy will be higher in the right-hand figure since the satellites are spread farther apart than the left-hand figure.

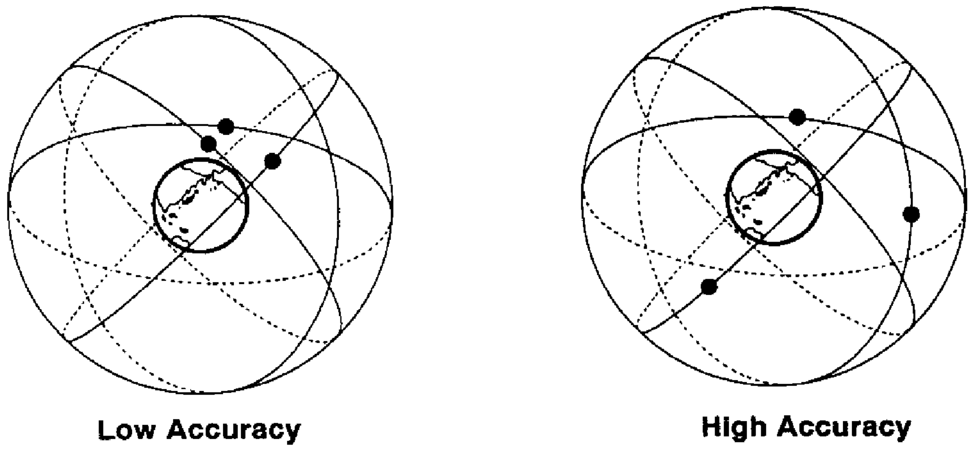


Figure 4-3 Satellite position and accuracy of fix

The index for position-fixing accuracy is known as HDOP (Horizontal Dilution of Precision). In simpler terms it is the geometrical relationship among three (or four) satellites. The higher the HDOP value the less accurate the position fix. The error in distance is proportional to the HDOP value as shown in Figure 4-4.

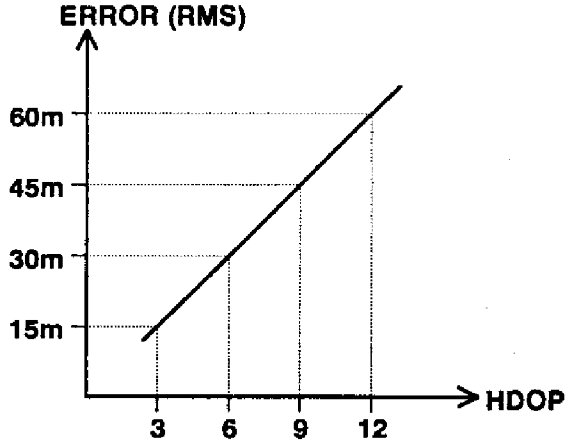


Figure 4-4 HDOP rate and position fix error

Almanac

Every satellite broadcasts its own orbital data and estimated orbital data of other satellites. This is called the **Almanac.** Using the Almanac the GPS receiver predicts arrival times of all GPS satellites, to acquire and receive GPS satellites. Thus if there is no Almanac in the GPS receiver it cannot fix its position. The unit contains no Almanac when shipped from the factory. Therefore, the receiver should be "cold started" after installation to receive the Almanac. Whenever the GPS receiver receives a satellite the Almanac is replaced by the latest one.

GPS Information on the Navigation Data Display

The navigation data displays shows GPS information, as well as navigation data.

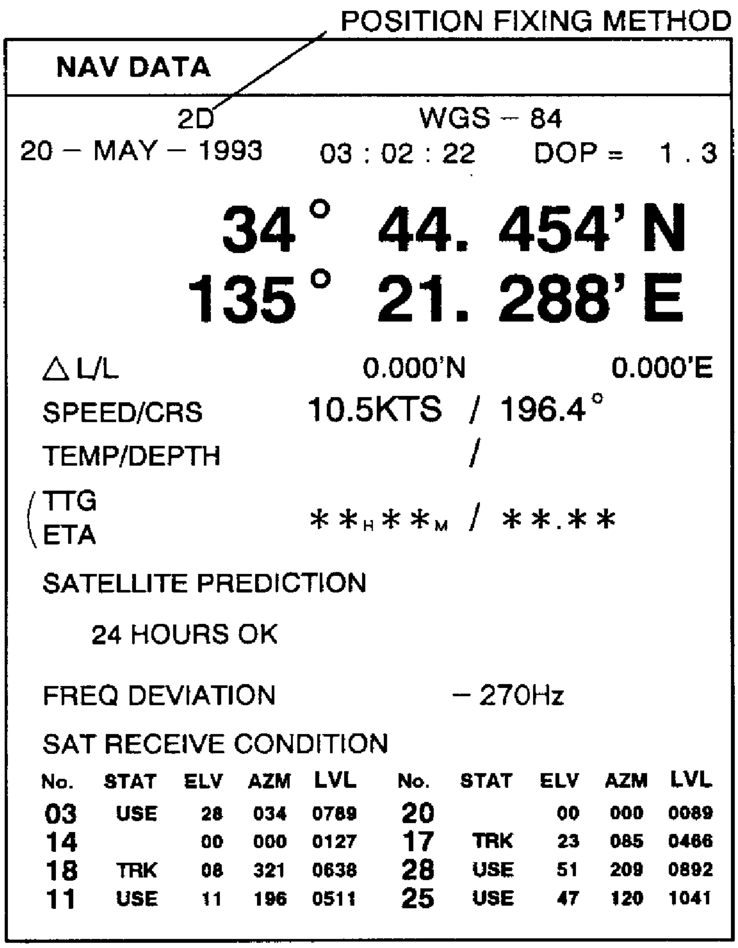


Figure 4-5 Sample navigation data display

GPS receiver condition

Table 4-1 explains the meanings of GPS receiver indications on the navigation data display.

Table 4-1 GPS indications on the navigation data display

Indication	Meaning
CST	COLD START. The receiver was started up with no Almanac. This condition occurs on initial power application after installation or when the GPS memory is cleared.
IMP	IMPOSSIBLE to receive. The GPS receiver is receiving current Almanac because the existing one shows no satellites within line-of-sight.
ACQ	ACQUIRING a satellite. According to the Almanac in the GPS receiver, a satellite is available in line-of-sight, and the GP-3100 is acquiring it but has not received it yet. If the ACQ state lasts a long time without changing to ALM (see ALM below), the receiver section may be faulty. (You can do the self test to verify receiver condition.)
ALM	ALMANAC is being received. According to the Almanac in the GPS receiver, three (or four) satellites are not in line-of-sight. Therefore, the receiver is receiving the Almanac to fix its position.
INT	Position-fixing INTERRUPTED. Reception is interrupted due to objects around the GPS antenna, etc. According to the Almanac, HDOP is still superior to the HDOP threshold. When the lost satellite reappears, calculation of position will be resumed.

Satellite schedule

The satellite schedule shows predicted date and time when the GPS receiver can fix its position by receiving GPS satellites. The time varies according to DOP threshold and position-fixing mode set on the GPS INITIAL SETTINGS menu.

Example 1

Indication: "24 HOURS OK". (Position fixes by GPS available round the clock.)

Example 2

1. 11:30
   (GPS position fixes available from current time to 11:30 of the same day)
2. 9/1 12:00 → 3:51
   (GPS position fixes available from 9/1 12:00 to 9/2 3:51)
3. 9/2 4:05 →
   (GPS position fixes available from 9/2 4:05 to 9/3 4:05.)

Frequency deviation

This indication shows how many hertz the GPS receiver is deviating from its assigned frequency of 1575.42 MHz. Less than about 3000 Hz is normal. Any deviation higher than that will mean more time is required to fix position.

Satellite information

Satellite information is shown as follows:

NO: Satellite no.
STAT: Satellite receiving condition
(TRK, Now tracking; USE, Using for position fixing)
ELV: Satellite elevation angle
AZM: Satellite azimuth (bearing)
LVL: Signal level (200 or better to get position fixes)

GPS Initial Settings

This section provides the information necessary for entering GPS initial settings.

1. Press **MENU** and **8** to select INITIAL SETTINGS.
2. Press [↑] to set the cursor on PAGE CHANGE (TO GPS INITIAL SETTINGS).

```
8 GPS INITIAL SETTINGS
PAGE CHANGE (TO INITIAL SETTINGS)
▶POSITION FIXING MODE=[2D]      3D       2D/3D
GEODETIC DATUM         = [WGS-84]  WGS-72  TOKYO  NAD
                          EURO    AUST    MISC   (007)
HDOP THRESHOLD         =20 (2~99)
TIME DIFFERENCE        = 09:00
LATITUDE               = 34° 00. 000' N
LONGITUDE              =135° 00. 000' E
DELTA LATITUDE         =00. 000' N
DELTA LONGITUDE        =00. 000' E
SMOOTHING              =00~00  POS-SPD (0~99)
ANTENNA HEIGHT         = 005  M
COLD START             =[NO]      YES
CST SATELLITE NO.      =07
MIN. ELEVATION ANGLE= 05° (5~90)
DESELECT SAT NO.       = – –

↑ ↓ : SELECT ITEM
→← : SELECT PARAMETER
PROGRAM NO.  :  20506101 * *
```

Figure 4-6 GPS INITIAL SETTINGS menu

Description

Table 4-2 describes the GPS INITIAL SETTINGS menu.

Table 4-2 Description of GPS INITIAL SETTINGS menu

ITEM	DESCRIPTION
POSITION FIXING MODE	Select position fixing mode. 2D: Position fixing by three satellites in line-of-sight of GPS receiver. 3D: Position fixing by four satellites in line-of-sight of GPS receiver. Position-fixing availability shorter than 2D but higher accuracy. 2D/3D: Position fixing by 2D or 3D (3D when available).
GEODETIC DATUM	Select geodetic datum system. WGS-84 (Standard chart system for GPS) WGS-72 (Worldwide chart system) TOKYO NAD (North America 1992) EURO (European 1950) AUST (Australian Geodetic 1984) MISC (See page 4-14.)
HDOP THRESHOLD	Index for position-fixing accuracy. When the HDOP threshold is lower than the preset HDOP, the indication “2D” is replaced by “DOP” to show poor position-fixing accuracy. The default setting is 20, which is suitable for most all conditions.
TIME DIFFERENCE	GPS uses UTC time (world standard time). If you would rather display satellite schedule in local time, enter time difference between UTC and local time. If local time is earlier than UTC time enter a minus sign before entering time difference.
LATITUDE	Enter ship's estimated latitude (at cold start).
LONGITUDE	Enter ship's estimated longitude (at cold start).
DELTA LATITUDE	Enter difference between displayed latitude and chart position. The icon “L/L” appears at the bottom right-hand corner when delta latitude is being used.
DELTA LONGITUDE	Enter difference between displayed longitude and chart position. The icon “L/L” appears at the bottom right-hand corner when delta longitude is being used.
SMOOTHING	Change smoothing to eliminate errors in GPS position due to changes of speed and course.
ANTENNA HEIGHT	Enter antenna height above the waterline.
COLD START	Manually cold start the GPS receiver to receive the Almanac. (Cold start is automatically done after clearing the GPS memory or at initial power application after installation.)
CST SATELLITE NO.	Manually select satellite to use for cold start, to reduce time required to complete cold start.

(Continued)

ITEM	DESCRIPTION
MIN. ELEVATION ANGLE	Enter minimum angle above the horizon a satellite must be positioned to use it for fixing position. The default setting is five degrees.
DESELECT SAT NO.	Every GPS satellite is broadcasting abnormal satellite number(s) in the Almanac. Using this information the GPS receiver eliminates any malfunctioning satellite from the GPS satellite schedule. Once the malfunctioning satellite is returned to on-line status it is automatically restored to the satellite schedule when the Almanac is received. In some instances however the Almanac may not contain information which announces that a satellite is now back on line. If you hear of this through another source, you can manually restore the satellite to the satellite schedule. This is called "Forced Health". Conversely, you can manually "Deselect" a healthy satellite if you hear it is "unhealthy." To force health or deselect a satellite see the procedure below.

Satellite force health/deselection

To force health or deselect a satellite;

1. Press **MENU** and **8** and then press [↑] to set the cursor on PAGE CHANGE (TO GPS INITIAL SETTINGS).
2. Press [↑]/[↓] to set the cursor on DESELECT SATELLITE NO. The display should look something like Figure 4-7.

SATELLITE CONDITION (NONE, No Satellite; OK, In Use; NG, No Good)

01 : NONE ( )	02 : OK (DESELECT)	01 : OK (FORCED)
04 : NONE ( )	05 : NONE ( )	04 : NG ( )
07 : NONE ( )	08 : NONE ( )	07 : OK ( )
10 : NONE ( )	11 : OK ( )	10 : OK ( )
13 : OK ( )	14 : OK ( )	13 : OK ( )
16 : OK ( )	17 : OK ( )	16 : OK ( )
19 : OK ( )	20 : OK ( )	19 : OK ( )
22 : NONE ( )	23 : OK ( )	22 : OK ( )
25 : OK ( )	26 : OK ( )	25 : OK ( )
28 : OK ( )	29 : NONE ( )	28 : NONE ( )
31 : NONE ( )	32 : NONE ( )	31 : NONE ( )

SATELLITE NO.

Figure 4-7 Sample satellite selection display

2. Enter satellite number using two digits.
3. Press the **Change** key to display desired option. Each press of the key deletes item in parentheses (namely, enables the satellite) or displays DESELECT or FORCED.
4. Press **ENT**.

GPS Smoothing

Latitude and longitude

When the DOP or receiving condition is unfavorable, the GPS fix may change greatly, even if the vessel is dead in water. This change can be reduced by smoothing the raw GPS fixes. A setting between 0 and 9 is available. The higher the setting the more smoothed the raw data. Note however that too high a setting slows response time to change in latitude and longitude. This phenomenon is especially noticeable at high ship's speeds. "0" is the normal setting; increase the setting if the GPS fix changes greatly.

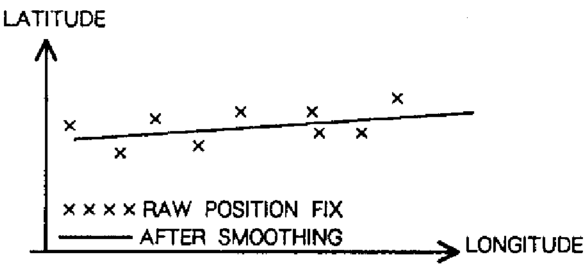


Figure 4-8 Latitude and longitude smoothing

Speed and course

During position fixing, ship's velocity (speed and course) is directly measured by receiving GPS satellite signals. The raw velocity data may change randomly depending on receiving conditions and other factors. You can reduce this random variation by increasing the smoothing. Like with latitude and longitude smoothing, the higher the speed and course smoothing setting the more smoothed the raw data. If the setting is too high, however, the response to speed and course changes slows. For no smoothing, enter "0". "5" is suitable for most conditions.

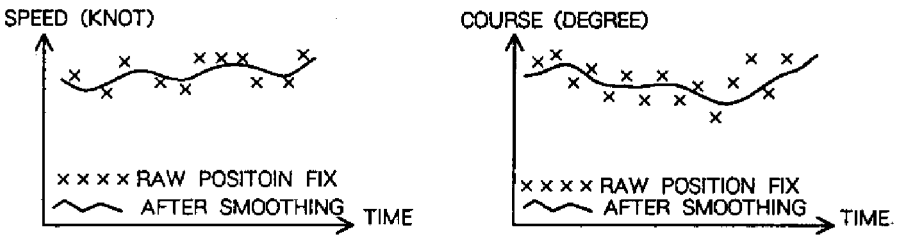


Figure 4-9 Speed and course smoothing

Setting GPS smoothing

The default GPS smoothing settings are suitable for most all conditions. If change of the default settings is necessary;

1. Press **MENU** and **8**, and then press [↑] to set the cursor on PAGE CHANGE (TO GPS INITIAL SETTINGS).

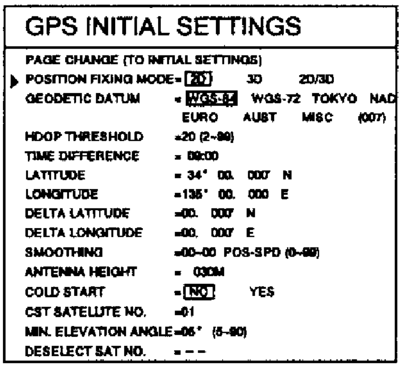


Figure 4-10 GPS INITIAL SETTING menu

2. Press [↑]/[↓] to set the cursor on SMOOTHING.
3. Enter latitude and longitude smoothing time from 0 – 99 minutes in two digits.
4. Enter speed and course smoothing time from 0 – 99 seconds in two digits.
5. Press **ENT**.

Cold Start

Cold start is automatically executed at initial power application or when the GPS memory is cleared. This is done to acquire the Almanac to receive a GPS satellite. You can also do the cold start manually when the Almanac is too old to acquire a satellite; for example, when the unit has not been used for about six months. Manually cold starting the GPS receiver erases the existing Almanac to receive the current one.

1. Press **MENU** and **8** to select INITIAL SETTINGS.
2. Press [↑] to set the cursor on PAGE CHANGE (TO GPS INITIAL SETTINGS).

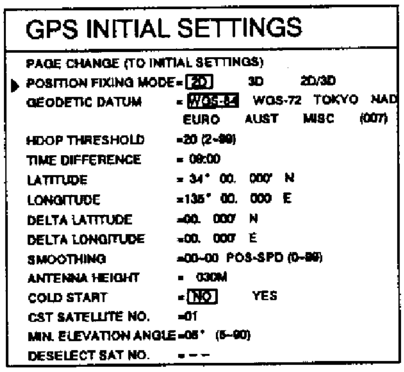


Figure 4-11 GPS INITIAL SETTINGS menu

3. Press [↑]/[↓] to select LATITUDE. Enter ship's latitude to within the accuracy of ±10°.
4. Press [↓] to select LONGITUDE. Enter ship's longitude to within the accuracy of ±10°.
5. Press [↓] to select ANTENNA HEIGHT and then enter antenna height above the waterline. To enter 15 meters, for example, press **0**, **1** and **5**.
6. If you know a satellite which is in line-of-sight, enter its number on the CST SATELLITE NO. line. This will reduce the time required to complete the cold start.
7. Operate arrow keys to select YES on the COLD START line.
8. Press **ENT**.
9. Press **NAV DATA** to display the navigation data display.

   The indication "CST" appears at the top of the display. When cold start is completed, "CST" is replaced by "2D" or "ACQ". Cold start takes 15 – 45 minutes to complete.

Geodetic Datum

Geodetic chart systems

A nautical chart is usually made by either trigonometrical survey or astronomical survey and according to the geodetic chart standards of the country it is used in. For example, the USA uses the system called Clarke; India, Everest, and Japan, Bessel. Accordingly when you are getting position fixes by GPS in the USA, the system should be Clarke so you don't get a position fix which shows you're somewhere offshore when you're actually moored to a dock.

Standard GPS chart system

While the use of one category of chart systems is fine if you don't do transoceanic voyages, ocean-going vessels may require all categories to get reliable position information. To solve this inconvenience, a standard chart system was adopted by GPS: the WGS-84.

Selecting chart system

Although the WGS-84 system is now widely used the other categories of charts still exist. Thus it is necessary to apply a correction value to the WGS-84 to match it to local geodetic systems.

The GP-3100 can perform this calculation automatically if you tell it (on the second line of the GPS INITIAL SETTINGS menu) what type of chart you're using. For Clarke charts, for example, select NAD (North America 1992). Select the chart system used, not the area where the boat is sailing.

1. Press **MENU** and **8** to select INITIAL SETTINGS.
2. Press [↑] to set the cursor on PAGE CHANGE (TO GPS INITIAL SETTINGS).
3. Press [↑]/[↓] to select GEODETIC DATUM.
4. Operate arrow keys to select chart you are using. For charts not listed on the menu, select MISC and then enter chart code referring to the chart codes listed on the next several pages.

Code number and geodetic chart system

001	WGS84	
002	WGS72	
003	TOKYO	Mean Value (Japan, Korea, and Okinawa)
004	NORTH AMERICAN 1927	Mean Value (CONUS)
005	EUROPEAN 1950	Mean Value
006	AUSTRALIAN GEODETIC 1984	Australia and Tasmania Island
007	ADINDAN	Mean Value (Ethiopia and Sudan)
008		Ethiopia
009		Mali
010		Senegal
011		Sudan
012	AFG	Somalia
013	AIN EL ABD 1970	Bahrain Island
014	ANNA 1 ASTRO 1965	Cocos Island
015	ARC 1950	Mean Value
016		Botswana
017		Lesotho
018		Malawi
019		Swaziland
020		Zaire
021		Zambia
022		Zimbabwe
023	ARC 1960	Mean Value (Kenya, Tanzania)
024		Kenya
025		Tanzania
026	ASCENSION ISLAND 1958	Ascension Island
027	ASTRO BEACON "E"	Iwo Jima Island
028	ASTRO B4 SOR. ATOLL	Tern Island
029	ASTRO POS 71/4	St. Helena Island
030	ASTRONOMIC STATION 1952	Marcus Island
031	AUSTRALIAN GEODETIC 1966	Australia and Tasmania Island
032	BELLEVUE (IGN)	Efate and Erromango Islands
033	BERMUDA 1957	Bermuda Islands
034	BOGOTA OBSERVATORY	Colombia
035	CAMPO INCHAUSPE	Argentina
036	CANTON ISLAND 1966	Phoenix Islands
037	CAPE	South Africa
038	CAPE CANAVERAL	Mean Value (Florida and Bahama Islands)
039	CARTHAGE	Tunisia
040	CHATHAM 1971	Chatham Island (New Zealand)
041	CHUA ASTRO	Paraguay
042	CORREGO ALEGRE	Brazil

043 : DJAKARTA (BATAVIA) : Sumatra Island (Indonesia)
044 : DOS 1968 : Gizo Island (New Georgia Islands)
045 : EASTER ISLANDS 1967 : Easter Island
046 : EUROPEAN 1950 (Cont'd) : Western Europe
047 : : Cyprus
048 : : Egypt
049 : :England, Scotland, Channel, and Shetland Islands
050 : : England, Ireland, Scotland, and Shetland Islands
051 : : Greece
052 : : Iran
053 : : Italy··Sardinia
054 : : Italy··Sicily
055 : : Norway and Finland
056 : : Portugal and Spain
057 : EUROPEAN 1979 : Mean Value
058 : GANDAJIKA BASE : Republic of Maldives
059 : GEODETIC DATUM 1949 : New Zealand
060 : GUAM 1963 : Guam Island
061 : GUX 1 ASTRO : Guadalcanal Island
062 : HJORSEY 1955 : Iceland
063 : HONG KONG 1963 : Hong Kong
064 : INDIAN : Thailand and Vietnam
065 : : Bangladesh, India, and Nepal
066 : IRELAND 1965 : Ireland
067 : ISTS 073 ASTRO 1969 : Diego Garcia
068 : JOHNSTON ISLAND 1961 : Johnston Island
069 : KANDAWALA : Sri Lanka
070 : KERGUELEN ISLAND : Kerguelen Island
071 : KERTAU 1948 : West Malaysia and Singapore
072 : LA REUNION : Mascarene Island
073 : L.C. 5 ASTRO : Cayman Brac Island
074 : LIBERIA 1964 : Liberia
075 : LUZON : Philippines (Excluding Mindanao Island)
076 : : Mindanao Island
077 : MAHE 1971 : Mahe Island
078 : MARCO ASTRO : Salvage Islands
079 : MASSAWA : Eritrea (Ethiopia)
080 : MERCHICH : Morocco
081 : MIDWAY ASTRO 1961 : Midway Island
082 : MINNA : Nigeria
083 : NAHRWAN : Masirah Island (Oman)
084 : : United Arab Emirates
085 : : Saudi Arabia
086 : NAMIBIA : Namibia
087 : MAPARIMA, BWI : Trinidad and Tobago
088 : NORTH AMERICAN 1927 : Western United States
089 : : Eastern United States

090 :		: Alaska
091 :		: Bahamas (Excluding San Salvador Island)
092 :		: Bahamas··San Salvador Island
093 :		: Canada (Including Newfoundland Island)
094 :		: Alberta and British Columbia
095 :		: East Canada
096 :		: Manitoba and Ontario
097 :		: Northwest Territories and Saskatchewan
098 :		: Yukon
099 :		: Canal Zone
100 :		: Caribbean
101 :		: Central America
102 :		: Cuba
103 :		: Greenland
104 :		: Mexico
105 :	NORTH AMERICAN 1983	: Alaska
106 :		: Canada
107 :		: CONUS
108 :		: Mexico, Central America
109 :	OBSERVATORIO 1966	: Corvo and Flores Islands (Azores)
110 :	OLD EGYPTIAN 1930	: Egypt
111 :	OLD HAWAIIAN	: Mean Value
112 :		: Hawaii
113 :		: Kauai
114 :		: Maui
115 :		: Oahu
116 :	OMAN	: Oman
117 :	ORDNANCE SURVEY OF GREAT BRITAIN 1936	: Mean Value
118 :		: England
119 :		: England, Isle of Man, and Wales
120 :		: Scotland and Shetland Islands
121 :		: Wales
122 :	PICO DE LAS NIVIES	: Canary Islands
123 :	PITCAIRN ASTRO 1967	: Pitcairn Island
124 :	PROVISIONAL SOUTH CHILEAN 1963	: South Chile (near 53° S)
125 :	PROVISIONAL SOUTH AMERICAN 1956	: Mean Value
126 :		: Bolivia
127 :		: Chile··Northern Chile (near 19° S)
128 :		: Chile··Southern Chile (near 43° S)
129 :		: Colombia
130 :		: Ecuador
131 :		: Guyana
132 :		: Peru
133 :		: Venezuela
134 :	PUERTO RICO	: Puerto Rico and Virgin Islands
135 :	QATAR NATIONAL	: Qatar

136 :	QORNOQ	: South Greenland
137 :	ROME 1940	: Sardinia Islands
138 :	SANTA BRAZ	: Sao Maguel, Santa Maria Islands (Azores)
139 :	SANTO (DOS)	: Espirito Santo Island
140 :	SAPPER HILL 1943	: East Falkland Island
141 :	SOUTH AMERICAN 1969	: Mean Value
142 :		: Argentina
143 :		: Bolivia
144 :		: Brazil
145 :		: Chile
146 :		: Colombia
147 :		: Ecuador
148 :		: Guyana
149 :		: Paraguay
150 :		: Peru
151 :		: Trinidad and Tobago
152 :		: Venezuela
153 :	SOUTH ASIA	: Singapore
154 :	SOUTHEAST BASE	: Porto Santo and Madeira Islands
155 :	SOUTHWEST BASE	: Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands
156 :	TIMBALAI 1948	: Brunei and East Malaysia (Sarawak and Sadah)
157 :	TOKYO	: Japan
158 :		: Korea
159 :		: Okinawa
160 :	TRISTAN ASTRO 1968	: Tristan da Cunha
161 :	VITI LEVU 1916	: Viti Levu Island (Fiji Islands)
162 :	WAKE-ENIWETOK 1960	: Marshall Islands
163 :	ZANDERIJ	: Suriname
164 :	BUKIT RIMPAH	: Bangka and Belitung Islands (Indonesia)
165 :	CAMP AREA ASTRO	: Camp Mcmurdo Area, Antarctica
166 :	G. SEGARA	: Kalimantan Islands (Indonesia)
167 :	HERAT NORTH	: Afghanistan
168 :	HU-TZU-SHAN	: Taiwan
169 :	TANANARIVE OBSERVATORY 1925	: Madagascar
170 :	YACARE	: Uruguay

AUTOPILOT INFORMATION

With autopilot connection, you can display various autopilot information on the display of the 3100. This chapter describes what information you receive with autopilot connection.

Features

The following features are available with autopilot (for example, FURUNO FAP-330) connection:

- The FAP-330 feeds autopilot information to the 3100 for display on the plot and video pilot displays.
- In the AUTO mode the FAP-330 automatically controls rudder movement in order to steer the vessel on a set course, thereby negating the effects of wind and current.
- When you restart the NAV mode when navigating a route, a line is drawn between restart point and next intermediate route waypoint. See Figure 5-1.
- The autopilot display can be turned on or off on the INITIAL SETTINGS menu.

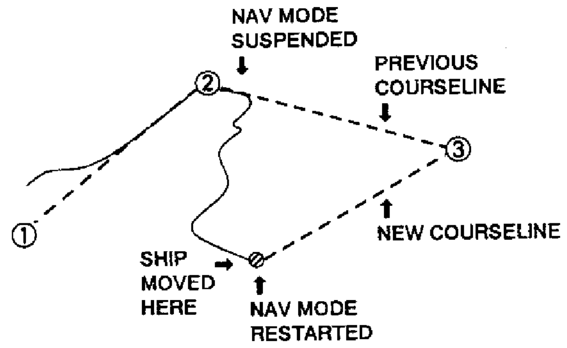


Figure 5-1 Courseline to next intermediate point drawn when NAV mode is restarted while navigating a route

Autopilot Information on Plot Display

Autopilot Information ☞
(FAP-330 in NAV Mode)

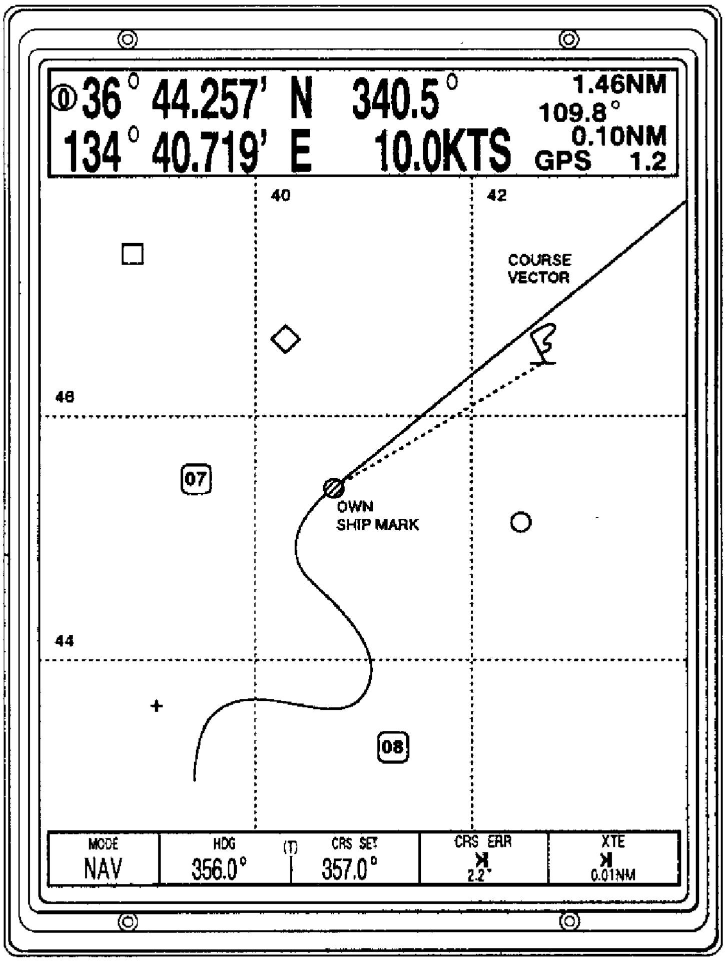


Figure 5-2 Sample autopilot information on plot display

Autopilot Information on Video Pilot Display

Autopilot Information ☞

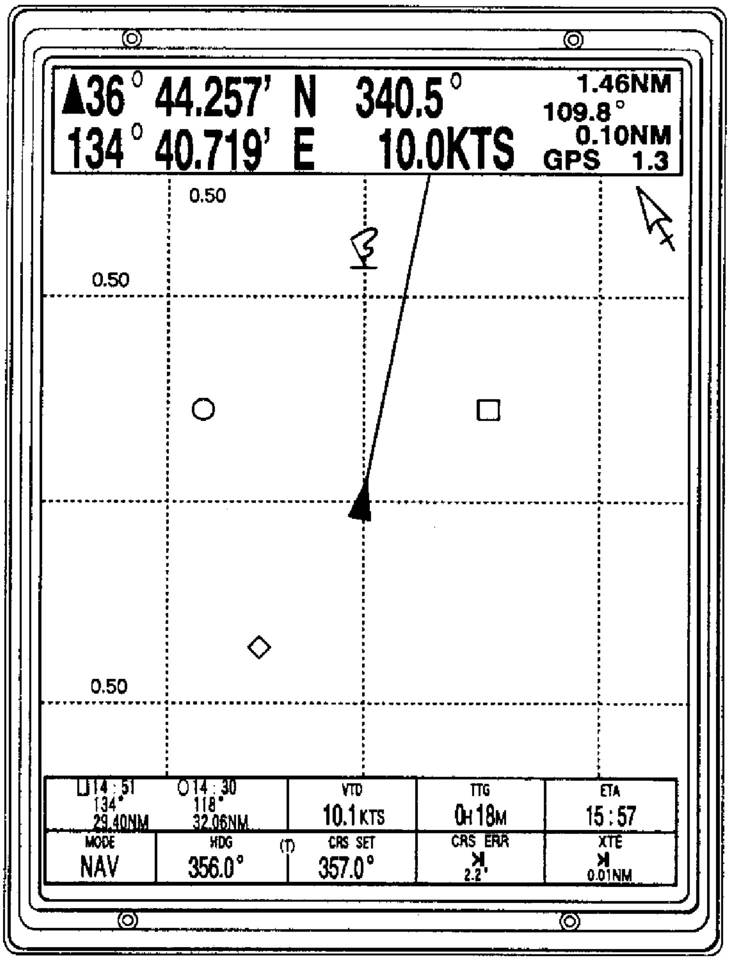


Figure 5-3 Sample autopilot information on video pilot display

Information according to autopilot condition

Autopilot off

(FAP-330 in AUTO Mode)

(FAP-330 in MANUAL Mode)

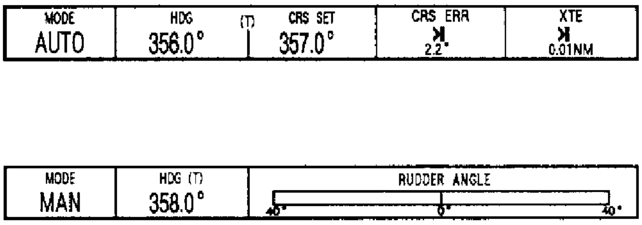
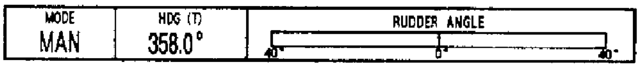
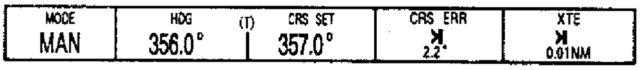


Figure 5-4 Autopilot information when autopilot is off

autopilot on, no destination waypoint selected



(a) Autopilot in MANUAL mode



(b) Autopilot in AUTO mode

T : True Bearing
M : Magnetic Bearing

Figure 5-5 Autopilot information when autopilot is on, destination waypoint selected

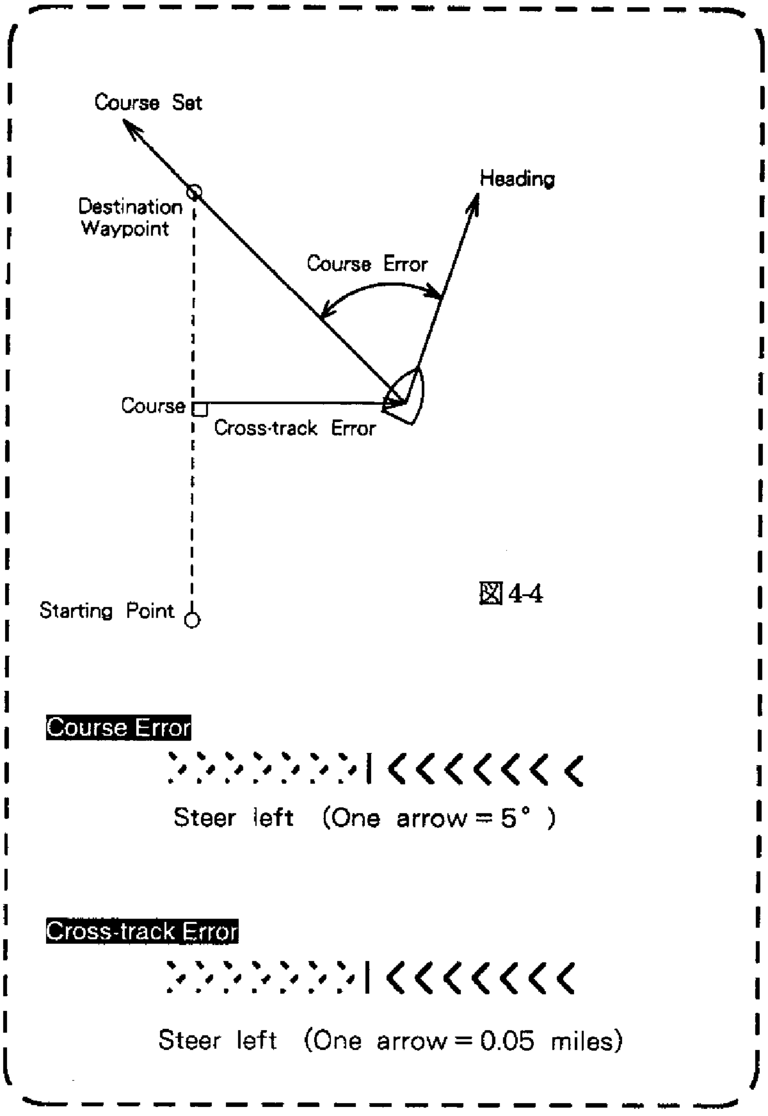


Figure 5-6 Course error and cross-track error indications

Autopilot on, destination waypoint selected

		VTD 10.1KTS	TTG 0H18M	ETA 15:57
MODE MAN	HDG (T) 356.0°	CRS SET 357.0°	CRS ERR ⋊ 2.2°	XTE ⋊ 0.01NM

(a) Autopilot in MANUAL mode

		VTD 10.1KTS	TTG 0H18M	ETA 15:57
MODE NAV	HDG (T) 356.0°	CRS SET 357.0°	CRS ERR ⋊ 2.2°	XTE ⋊ 0.01NM

(C) Autopilot in NAV mode

Figure 5-7 Autopilot information when autopilot is on, destination waypoint selected

Autopilot on, mark entered, destination waypoint selected

□14:51 134° 29.40NM	○14:30 118° 32.06NM	VTD 10.1KTS	TTG 0H18M	ETA 15:57
MODE MAN	HDG (T) 358.0°	RUDDER ANGLE 40° 0° 40°		

(a) Autopilot in MANUAL mode

□14:51 134° 29.40NM	○14:30 118° 32.06NM	VTD 10.1KTS	TTG 0H18M	ETA 15:57
MODE AUTO	HDG (T) 356.0°	CRS SET 357.0°	CRS ERR ⋊ 2.2°	XTE ⋊ 0.01NM

(b) Autopilot in AUTO mode

□14:51 134° 29.40NM	○14:30 118° 32.06NM	VTD 10.1KTS	TTG 0H18M	ETA 15:57
MODE NAV	HDG (T) 356.0°	CRS SET 357.0°	CRS ERR ⋊ 2.2°	XTE ⋊ 0.01NM

(C) Autopilot in NAV mode

Figure 5-8 Autopilot information when autopilot is on, mark entered, destination waypoint selected

■ **NOTE:** *Mark data remains on the display, even if associated marks are erased, until the next mark is entered.*

MAINTENANCE AND TROUBLESHOOTING

Regular maintenance is important for good performance. Following the procedures set forth in this chapter will help keep your unit in top operating condition for many years to come.

Self Test

The display unit incorporates several types of self tests which check the system for proper operation.

Self test at power on

Each time you turn on the power all devices and the internal battery are checked for proper operation. The display shows the results of the check as OK (normal) or NG (No Good). In the sample results shown in Figure 6-1, all devices and the internal battery are operating normally.

```
START UP TEST

ROM                          = OK
SRAM                         = OK
VRAM                         = OK
INTERNAL BATTERY             = OK
```

Figure 6-1 Sample start up self test results

■ **NOTE:** *If NG is shown for the internal battery, do the following:*

1) Press any key.
2) Save display to a memory card and then turn off the power.
3) Request replacement of the internal battery.

Self test menu

The self test menu (see Figure 6-2) appears by pressing **MENU** and **9** twice. It provides four types of self tests:

- Memory circuits/ I/O ports
- Keyboard test
- Test pattern 1 (color dropout), and
- Test pattern 2 (color distortion).

Memory circuits/ I/O ports

This test continuously checks the memory circuits and I/O ports. Further, it can check ROM and RAM cards for proper operation, by inserting them before executing the test. (If no card(s) is inserted, NG appears as the results for the card check.)

1. Press **MENU**.
2. Press **9** to select MISC.
3. Press **9** to display the SELF TEST menu.

```
9 - 9 SELF TEST
1 MEMORY•I/O PORT
2 KEYBOARD
3 TEST PATTERN 1
4 TEST PATTERN 2
```

Figure 6-2 SELF TEST menu

4. Press **1** to select MEMORY • I/O PORT.

   Then, the unit checks each memory circuit and I/O port one by one, displaying the results after each checking each item.

```
9 - 9 - 1 MEMORY TEST
*ROM                     =OK
SRAM                     =OK
VRAM                     =OK
MEMORY CARD   UPPER      OK
              LOWER   =  OK
INTERNAL BATTERY         =OK
CARD BATTERY  UPPER      OK
              LOWER   =  OK
SIO (DATA IN/OUT)        =OK
SIO (AUTOPLOT)           =OK
SIO (OPTION)             =OK
GPS                      =OK

PRESS ANY KEY TO EXIT.
```

Figure 6-3 Sample memory circuit/ I/O port test results display

5. To escape from the test, press any key.

Keyboard test

1. Press **MENU**, **9**, **9** and **2** to select KEYBOARD TEST. The display should look like Figure 6-4.

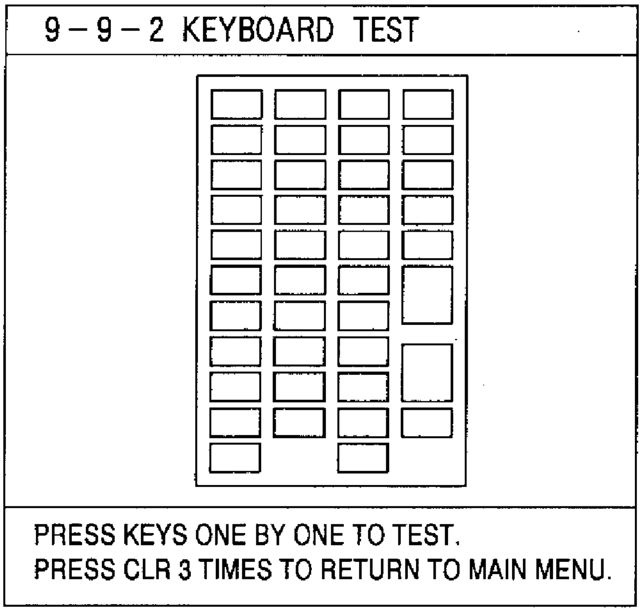


Figure 6-4 Keyboard test display

2. Press each key one by one. If a key is functioning normally
    - its location on the display lights in light-blue.
3. After pressing all keys, press **CLR** <u>three</u> times to escape (to the menu).

Test pattern 1 (color dropout)

This test checks for color dropout.

1. Press **MENU, 9, 9** and **3** to display TEST PATTERN 1. Check the pattern for color dropout.

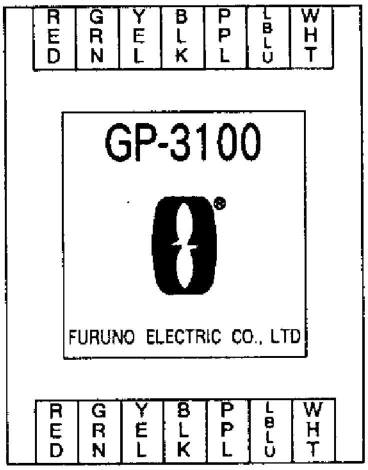


Figure 6-5 Test pattern 1

2. Press any key to escape.

Test pattern 2 (color distortion)

This test checks for color distortion.

1. Press **MENU, 9, 9** and **4** to display TEST PATTERN 2.

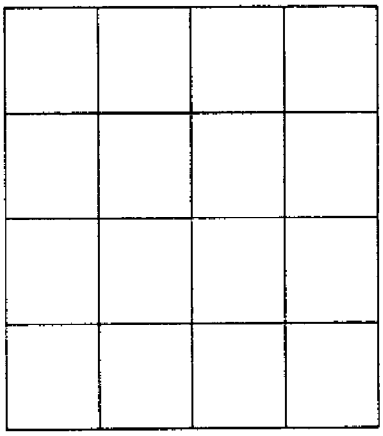


Figure 6-6 Test pattern 2

2. Press keys 1 – 7 one by one to check for proper display of colors.
3. Press any key except numeral keys to escape.

Error Messages

The following is an alphabetical listing of error messages which may appear on the display along with an explanation of what they mean and what to do when they appear.

Cannot be deleted together.

Cannot delete both current track and loaded track together by the cursor. Use the BOX method.

Cannot load waypoint/route when destination is selected.

Destination waypoint is selected.

Cannot write over entered waypoint no.

Waypoint 99 entered on route list. This number is reserved for external waypoint.

Card is full.

Not enough memory space on card to save file. Use new memory card.

Card is write protected. Try again?

Memory card write protected. Release write protection tab on card.

Card not formatted.

Memory card not formatted. Format memory card.

Correction value is too large.

Correction value entered is greater than 60 minutes.

Could not delete. Press any key.

Memory card write protected.

Could not load.

Memory card contents may be corrupted.

Could not load. Press any key to exit.

Memory card ejected before it could be loaded.

Could not save. Press any key.

- Memory card write protected.
- ROM card inserted instead of memory card.

Could not save. Try again?

- Memory card write protected.
- ROM card inserted instead of memory card.
- Memory card is full.

Data error.

- No data entered in waypoint selected.
- No data entered in route selected.
- **ENT** key pressed before entering data.

Formatting failed. Press any key to exit.

- Memory card is write protected.
- ROM card inserted instead of memory card.

Insert memory card.

Load area too small.

Not enough memory space remaining on the display to load file desired.

Memory card not inserted. Insert memory card and press ENT.

- a) Memory card not inserted properly.
- b) Memory card inserted in wrong slot.

Memory card replaced.

Memory card replaced during operation.

No file.

No file by that name exists.

No files on card. Insert proper memory card and press ENT.

No files on memory card to delete.

No ship's position input.

No navigation data input. Check navigator (external navigator used) and check navigation selection on the INITIAL SETTINGS menu.

Too many files. Press any key to exit.

Too many files to save information to memory card. Delete a file (menu 37), or use new memory card.

Waypoint already used.

Waypoint being used as destination waypoint.

Waypoint area is full.

No free waypoint area when waypoint registered without entering waypoint number.

Waypoint number already exists.

L/L position of waypoint entered as route point matches L/L position of a registered waypoint.

Maintenance and Checking

This section contains maintenance and checking information for both the user and the service technician. Maintenance procedures intended for the service technician are marked so.

Regular maintenance and checking are important for good performance. Following the recommended procedures will help keep your unit in good operating condition for many years.

Regular maintenance

A regular maintenance schedule should be established and should include at least the following.

- Checks connectors and terminals on rear of unit for proper seating and rust. Clean if necessary.
- Check earth terminal for rust. Clean if necessary.
- Dust on the display dims the picture. Clean the display screen regularly with a soft cloth. The only recommended cleaning agent is an anti-static spray.

Demagnetizing the display

Irregular picture color can often be cleared by turning off and on the power. If that doesn't work, use a demagnetizer to demagnetize the display.

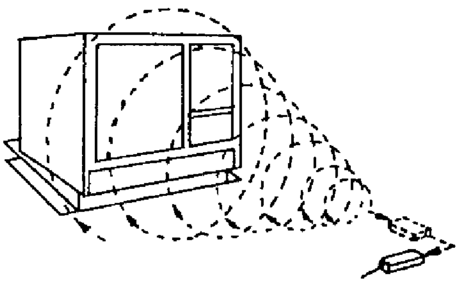


Figure 6-7 How to demagnetize the display

Replacement of fuse

The fuse on the rear of the unit protects it from equipment fault and overcurrent. When you cannot turn on the power, check the fuse on the rear of the unit. If the fuse has blown, check the cause before replacing it. Use only the rated fuse. Use of the wrong fuse will damage the unit and void the warranty.

Proper fuse

12 V set – 15A
24 V set – 7A

Replacement of batteries

Both the GDC Board inside the display unit and the memory cards use a battery to store information. The life of these batteries is about three years. When the voltage of a battery is low, the "battery" icon appears on the display. The offending battery should be replaced at your earliest convenience, so that important information will not be lost.

Table 6-1 Replacement battery types and code numbers

Battery	Type	FURUNO Code No.
Memory Card Battery	Lithium Battery, BR-2325	000-126-680
Battery on GDC Board	Lithium Battery, BR-2/3AE 2P	000-123-713

Memory card battery

■ **NOTE:** *Insert new battery within 10 minutes after removing expired battery. Otherwise, the information stored on the card will be lost.*

1. Open the battery lid with a small phillips head screwdriver (supplied). Remove battery.
2. Insert new battery plus terminal facing upward.
3. Close battery lid.

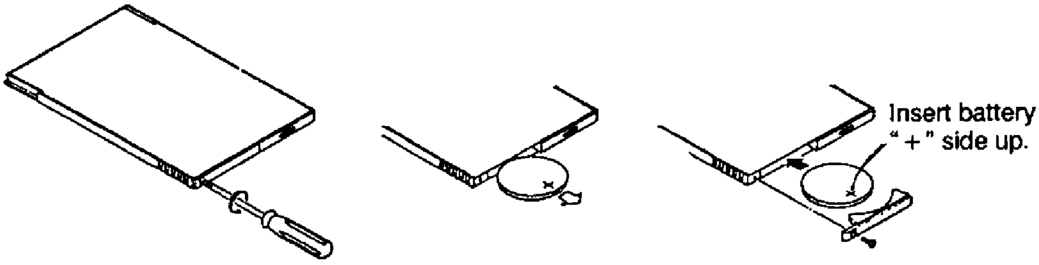


Figure 6-8 How to replace memory card battery

Battery on GDC board (for technicians only)

This procedure requires suitable insulating material to lay beneath the GDC Board to prevent shorting.

1. Turn off power and dismount GPC Board. Place board on insulating material.
2. Dismount battery. Install new battery.
3. Remount GDC Board.

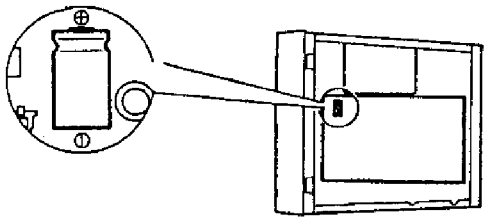


Figure 6-9 Location of battery on GDC board

Verifying program version no.

The procedure which follows shows how to verify the program version no. of both the plotter section and the GPS section (GP-3100).

Plotter section

1. Press **MENU**.
2. Press **8** to select INITIAL SETTINGS.

   The plotter program number appears at the bottom of the display. The extreme right two digits are the plotter program version number.

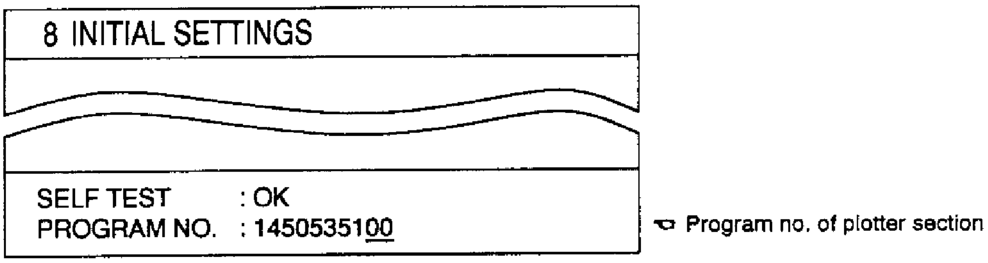


Figure 6-10 INITIAL SETTINGS menu, showing location of plotter program number

GPS section (GP-3100 only)

3. Press [↑] to select PAGE CHANGE (TO GPS INITIAL SETTINGS).

   The GPS program number and version number appear at the bottom of the display.

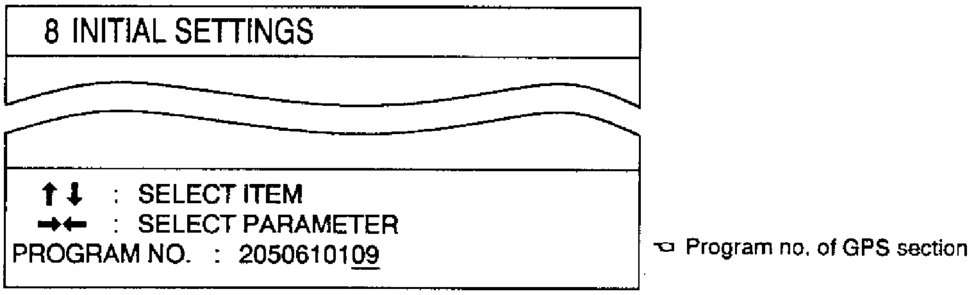


Figure 6-11 GPS INITIAL SETTINGS menu, showing location of GPS program number

Replacement of program ROM (service technician only)

The program ROMs for the plotter section and the GPS section (GP-3100) are on the GDC Board and GPS Board (GP-3100), respectively. Use an IC Puller to dismount ROMs.

■ **NOTE 1:** *When the GPS Board is dismounted all GPS initial settings are cleared.*

■ **NOTE 2:** *The first self test after replacing the ROM on the GPS Board will show GPS = NG. This is because GPS data was cleared when the ROM was replaced. This is normal and not a sign of malfunction.*

1. Turn off the power and remove cover.
2. Replace program ROM (U9) on the GDC Board.
3. Detach GPS Board cover.
4. Replace program ROM (U2) on the GPS Board. Attach GPS Board cover.
5. Reassemble unit.

Suitable ROM

GDC Board: blank ROM MSM27C402K-15 (4M, 40 pin), or equivalent
GPS Board: blank ROM M5M27C202K-10 (2M, 40 pin), or equivalent

10 inch color CRT monitor service parts

The table which follows lists the service parts for the 10 inch color CRT monitor.

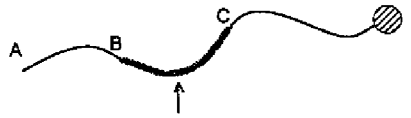
Table 6-2 10 inch color CRT monitor service parts

Part	Type	Code No.
CRT	E2957B22-TC30ET (Y)	000-126-946
Flyback Transformer	DH-1518-01	000-126-947
Degauss Coil	DL-594	000-123-343
CRT SOCKET Board Assy.	PD667-2-2 Assy.	000-126-948
MAIN Board Assy.	PD667-1-2 Assy.	000-126-949

Troubleshooting

The section provides a troubleshooting table which the user can follow to identify and resolve operating problems. In most cases the cause of operating problems is simple; wrong key pressed, loosened connection, etc.

Table 6-3 Troubleshooting table

IF...	THEN...
Plotter Section (GD-3100/GP-3100)	
you cannot turn on the power	• check for blown fuse. • have a service technician measure voltage at power connector to confirm if it is within specified rating. • the power cable may be too thin; you may not be able to turn on the power because of large power loss (12 V set).
when turning on the power the self test results are not cleared after several seconds	• check for NG display. • press any key to try to restore normal operation. If that doesn't work, call for service.
nothing appears on the display	• try to adjust screen brilliance. • the unit may be operating in the economy mode. Press any key to cancel the economy mode.
own ship mark blinks fastly	• there is no navigation input. Check navigation device (external) and navigation aid selection on MENU 8.
asterisks appear instead of ship's position	• the navigation device (external) may be off. • check for loosened connection on navigator (external). • check navigation aid selection for error.
old track is erased	• the track memory is full. Save track to a memory card and then delete it from the display (MENU 72), or delete unnecessary track.
you erased old track but old track is still being erased	• you erased a mid section of the track.  Erasing section BC of track does not make space in memory; erase section AB to make space in memory.

(Continued)

IF...	THEN...
Plotter Section (GD-3100/GP-3100)	
track is not displayed	• the menu item TRACK (HOLD PLOT) on the INITIAL SETTINGS menu is set for OFF. (no track display during no recording of track)
you cannot enter marks or lines	• the mark memory is full. Press **MENU**, **7** and **3** to check number of mark points used.
you cannot erase a mark	• two or more marks may share the same position. Press **CLR** several times to delete.
you cannot erase the flag mark on a route	• the point is currently selected as a destination waypoint. • it is part of a registered route.
you have selected a route for navigation but route waypoints are not connected	• a route waypoint which is within the arrival alarm range is selected. • ROUTE LINE on SPECIAL menu (MENU 96) is set for OFF.
estimated time of arrival is wrong	• clock setting is wrong. Press **MENU** and **8** to set clock.
bearing display on the 3100 is different from that output by another navigation aid	• bearing display method is not the same on each unit. • magnetic variation is applied to external navigator. Press **MENU** and **8** and then change bearing mode or apply magnetic variation correction.
asterisks are displayed instead of Loran TDs	• wrong Loran TD setting on MENU 8. Display that menu and reenter TDs.
Loran TDs are wrong	• enter a TD offset value on MENU 8.
speed change reaction is too slow (for example, ship dead in water but display shows ship speed)	• check for unsuitable smoothing setting. Enter suitable smoothing figure on MENU 8.
a key is pressed but there is no response	• the keyboard may have locked. Do the following; 1) Turn off the unit. 2) Turn ON DIP switch S1#1 on the GDC Board. 3) Turn on the power, and then press **MENU**, **9**, **8** and **4** (GP-3100) or **MENU**, **9**, **8** and **2** (GD-3100) to clear all memories. If this doesn't work, call for service.
you cannot save display to a memory card	• the card has not been formatted. • the card is write protected. • the card is full.

(Continued)

IF...	THEN...
GPS Section (GP-3100)	
GPS accuracy is poor	• check for wrong antenna height setting on the GPS INITIAL SETTINGS menu.
GPS position-fixing time is short	• HDOP threshold and maximum elevation angle settings on GPS INITIAL SETTINGS menu may be wrong. The default settings of 20 (HDOP) and 5° (elevation angle) work well in most all cases.
position-fixing time much shorter than that of other vessels	• HDOP setting (GPS INITIAL SETTINGS menu) is too small.
there is no position fixing	• the Almanac is more than one-year old. • check for wrong date and time on INITIAL SETTINGS menu. • check antenna.

Appendix

The appendix contains specifications, equipment lists, complete menu tree, menu description, and default settings.

Specifications A-2
Menu Tree A-4
Menu Description A-5
Default Settings A-7

Specifications

RECEIVER (GP-3100 only)

Number of Receiving Channels	8 channels
Tracking Capacity	8 satellites
Tracking System	Parallel in view
Position Fixing System	All in view, 8-state Kalman filter
Accuracy	Horizontal: 15 m RMS (2D, HDOP ≤3 SA OFF) Velocity: 01. kt RMS (2D, HDOP ≤3 SA OFF) *GPS accuracy controlled by U.S. Department of Defense.*
Initial Tracking Time	Warm Start: About 45 seconds Cold Start: About 15 minutes
Tracking Velocity	200 m/s (720 km/h)
Maximum Velocity	1 g
Position Update Interval	1 second

PLOTTER (GD-3100/GP-3100)

Display	10" high resolution color CRT Effective area: 180 × 135 mm Display pixels: 640 × 480 dots
Projection	Mercator
Usable Area	85° latitude or below
Effective Projection Area	0.14 to 6,144 nm
Track Display	Plot interval: by time (0 to 60 min.) or by distance (0 to 9.99 nm) Colors: red, yellow, green, purple, light-blue, blue, white Memory capacity: 8,000 points (see * on next page)

(Continued)

Marks and Storage Capacity

Mark	Storage Capacity
Track, mark, line w/mark, external event	8,000 points *
Waypoint	98 points
Route (15 pts./route)	10 routes
External waypoint	1 point

* *Can be freely apportioned between tracks and marks.*

Information Display

Ship's L/L position (Loran C or A TDs also possible)
Date and time
Ship's speed
Chart scale
Waypoint L/L position
Range and bearing to destination waypoint
Cursor intersection L/L position
Range and bearing to cursor intersection
Water temperature and water depth (sensor required)

Alarm Functions

Arrival and anchor watch alarms
XTE (cross track error) and border alarms
Ship's speed in and out alarms

Input/Output Data

FURUNO CIF, NMEA 0180C/0182, NMEA 0183
(Input and output data share same format.)

Environment

Temperature: 0°C to 40°C (display unit), -30°C to 70°C (antenna unit)

Power Supply and Power Consumption

24V spec. (std.): 18 – 40VDC, less than 57W
12V spec.: 10.2 – 18.5VDC, less than 57W
100V, 115V, 120V AC, 1ø, 50-60 Hz (rectifier required)

Economy mode consumes less than 10W power.

Cover Color

Munsell 2.5GY5/1.5

Menu Tree

The menu tree is useful for finding menu number. The numbers in the tree are the number keys you press to display a menu. For example, if you want to test the keyboard, press **9** (MISC), **9** (SELF TEST) and **2** (KEYBOARD).

MENU

- 1 WAYPOINT
- 2 ROUTE
- 3 SAVE DATA TO MEMORY CARD
  - 1 TRACK
  - 2 MARK/LINE
  - 3 WAYPOINT/ROUTE
  - 4 INITIAL SETTINGS
  - 7 DELETE MEMORY CARD DATA
  - 8 FORMAT MEMORY CARD
  - 9 SELECT CARD SLOT (1 UPPER 2 LOWER)
- 4 LOAD MEMORY CARD
  - 1 TRACK
  - 2 MARK/LINE
  - 3 WAYPOINT/ROUTE
  - 4 INITIAL SETTINGS
  - 9 SELECT CARD SLOT (1 UPPER 2 LOWER)
- 5 DISPLAY MEMORY CARD
- 6 CORRECT POSITION
- 7 APPORTION/DELETE MEMORY
  - 1 APPORTION MEMORY
  - 2 DELETE TRACK
  - 3 DELETE MARK
- 8 INITIAL SETTINGS
- 9 MISC
  - 1 EDIT TRACK/MARK
  - 2 CALCULATE RANGE/BEARING
  - 6 SPECIAL
  - 7 SELECT MARKS/ CONTOUR LINES
  - 8 CLEAR MEMORY
    - 1 CLEAR SCREEN DATA
    - 2 CLEAR ALL GD DATA
    - 3 CLEAR GPS DATA
    - 4 CLEAR ALL DATA
  - 9 SELF TEST
    - 1 MEMORY·I/O PORT
    - 2 KEYBOARD
    - 3 TEST PATTERN 1
    - 4 TEST PATTERN 2

Menu Description

Menu No.	Menu	Function
1	WAYPOINT	Register waypoint by latitude and longitude, edit or delete waypoint, display waypoint list.
2	ROUTE	Display route list to register, delete, calculate or change route.
3	SAVE DATA TO MEMORY CARD	Save desired display component to memory card. 1. TRACK: Save track. 2. MARK/LINE: Save marks/lines. 3. WAYPOINT/ROUTE: Save waypoint/route. 4. INITIAL SETTINGS: Save initial settings. 7. DELETE MEMORY CARD DATA: Delete file on memory card. 8. FORMAT MEMORY CARD: Prepare memory card for use with system. 9. SELECT CARD SLOT: Select memory card slot to use.
4	LOAD MEMORY CARD	Load memory card-stored item. 1. TRACK: Load track. 2. MARK/LINE: Load marks/lines. 3. WAYPOINT/ROUTE: Load waypoints/routes. 4. INITIAL SETTINGS: Load initial settings. 9. SELECT CARD SLOT: Select memory card slot to use.
5	DISPLAY MEMORY CARD	Play back memory card. (Note that display is not cleared.)
6	CORRECT POSITION	Correct chart position error.
7	APPORTION/DELETE MEMORY	Apportion or delete memory. 1. APPORTION MEMORY: Apportion memory between track and marks. Total capacity for marks and track is 8,000 points. 2. DELETE TRACK: Delete all track. 3. DELETE MARK: Delete all marks.
8	INITIAL SETTINGS	Display INITIAL SETTINGS menu.

Menu No.	Menu	Function
9	MISC	1. EDIT TRACK/MARK: Edit, delete tracks and marks 2. CALCULATE RANGE/BEARING: Calculate range and bearing between two points. 6. SPECIAL 1) TIME MARK: Turn time mark on or off. 2) EVENT MARK WINDOW: Turn mark information window on video pilot display on or off. 3) ROUTE LINE: Connect or disconnect route waypoints. 4) SCREEN SCALE: Select chart scale for distance or scale. 5) AP DATA FORMAT: Select autopilot data format. 7. SELECT MARKS/CONTOUR LINES: Select color of chart marks and contours lines and turn them on or off. 8. CLEAR MEMORY 1) CLEAR SCREEN DATA: Clear current display. 2) CLEAR ALL GD DATA: Clear GD data. 3) CLEAR GPS DATA: Clear GPS receiver data (GP-3100 only). 4) CLEAR ALL DATA: Clear both GD and GPS data (GP-3100 only). 9. SELF TEST 1) MEMORY/ I/O PORT: Check memories and I/O ports. 2) KEYBOARD: Test keyboard. 3) TEST PATTERN 1: Test for color dropout. 4) TEST PATTERN 2: Test for color distortion.

Default Settings

Menu	Default Setting
CHANGE TRACK COLOR Menu	Red
CHANGE MARK COLOR Menu	Red
DESTINATION SETTING Menu	Cursor
ROUTE Menu	Cursor
ALARM Menu	Arrival/Anchor alarm: OFF Range: 0.5 nm XTE/Border alarm: OFF Range: 0.25 nm Ship's Speed Alarm: OFF High: 15 kts, Low: 11 kts
GEODETIC CHART DATUM Menu	Land Density: 4 Land Color: Yellow Place-Name Display: ON Grid: ON Background Color: Black Background Brightness: High

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Index

A

Alarms (ALARM key) 2-19 - 2-24
    anchor watch, 2-21
    arrival, 2-19
    border, 2-22
    ship's speed, 2-23
    silencing, 2-24
    XTE (cross-track error), 2-21
Almanac
    description, 4-4
    receiving, 4-13
Anchor watch alarm, 2-21
Apportioning the memory, 3-30
Arrival alarm, 2-19
Autopilot information, 5-1 - 5-6
    plot display, 5-3
    video pilot display, 5-4 - 5-6

B

Battery replacement
    GDC Board, 6-11
    memory card, 6-10
BRILL ECONO key, 1-12, 1-26
Border alarm, 2-22

C

Card drives, 1-13 - 1-15
CENTER key, 1-10, 1-14
Change
    line color, 2-25
    mark color, 1-22
    mark shape, 3-22
    track appearance, 3-21
    track color, 2-4
CHART key, 2-39
Charts
    cancelling position correction, 3-15
    changing appearance, 2-39
    chart-related icons, 1-15
    correcting position by cursor, 3-13
    correcting position by Delta L/L, 3-14
    correcting position by L/L coordinates, 3-14
    displaying, 1-13
    selecting chart scale, 1-11
Clearing the memories, 3-38 - 3-39
Cold start (GP-3100), 4-13
Comment for waypoint, 2-11
Control description, 1-3
Course vector, 1-28
Cross-track error (XTE) alarm, 2-21
Cursor, 1-7
Cursor key, 1-7

D

Data window selection, 1-16
Default settings, A-7
Delete
    all marks/lines, 3-12
    all route waypoints on a route, 3-7
    all track, 3-11
    external waypoint, 2-14
    file on memory card, 3-24
    line, 2-25
    mark, 1-23
    route waypoint, 3-7
    track by box cursor, 3-23
    track by color, 2-5
    tracks, marks, lines from memory card, 3-24
    waypoints by cursor, 2-14
    waypoints by waypoint list, 2-14
Demagnetizing the display, 6-9
Destination waypoint 2-15 - 2-18
    cancelling, 2-18
    displaying range and bearing to, 2-17
    setting by cursor, 2-15
    setting by range and bearing, 2-16
    setting by waypoint number, 2-16
Display icons, 1-27
Display mode selection, 1-17

E

Economy mode, 1-26
Enter
    comment for waypoint, 2-11
    line by cursor, 2-25
    magnetic variation, 2-38
    mark at your ship's position, 1-22
    mark by cursor, 1-22
    mark by L/L coordinates, 3-10
    time and date, 2-3
    waypoint by cursor, 2-8
    waypoint by L/L coordinates, 2-7
    waypoint by navigation aid, 2-10
    waypoint by range and bearing, 2-10
    waypoint by your ship's position, 2-9
Error messages, 6-6 - 6-8
External event mark, 3-9

F

Formatting a memory card, 2-28
Fuse replacement, 6-9

G

GDC Board
  replacing battery, 6-11
Geodetic chart system selection, 4-14 - 4-18
GPS, 4-1 - 4-18
  almanac, 4-4
  cold start, 4-13
  description of system, 4-2 - 4-4
  GPS information on navigation data display, 4-5
  GPS receiver frequency deviation, 4-7
  GPS smoothing, 4-11
  initial settings, 4-8 - 4-10
  receiver condition, 4-6
  satellite forced health/deselection, 4-10
  satellite information, 4-7
  satellite schedule, 4-7

I

Icons
  chart related, 1-15
  chart related and other, 1-27
Initial settings
  GPS initial settings, 4-8 - 4-10
  playing back, 3-37
  saving, 3-37

K

Keyboard test, 6-4

L

Lines
  changing color, 2-25
  deleting all, 3-12
  deleting individual, 2-25
  entering, 2-25
Loran A TDs, 2-35
Loran C TDs, 2-36
Loran TD correction, 3-16

M

Magnetic bearing, 2-38
Magnetic variation entry, 2-38
Maintenance 6-6 - 6-13
  cleaning and inspection, 6-9
  demagnetizing the display, 6-9
  displaying program version number, 6-11
  replacing battery on GDC Board, 6-11
  replacing memory card battery, 6-10
  replacing Program ROMs, 6-12
  replacing the fuse, 6-9
MARK COLOR key, 1-22
Marks
  changing color, 1-22
  changing shape, 3-22
  deleting all, 3-12
  deleting individual, 1-23
  entering at your ship's position, 1-22
  entering by cursor, 1-22
  entering by L/L coordinate, 3-10
Memory
  apportioning, 3-30
  clearing GD and GPS data (GP-3100), 3-39
  clearing GD data, 3-38
  clearing GPS data (GP-3100), 3-39
  clearing the display screen, 1-24
  reading number of marks/lines, track used, 3-31
Memory card
  adding track, marks/lines, 3-24
  deleting a file, 3-24
  formatting, 2-28
  playing back, 2-32
  replacing battery, 6-10
  saving data to, 2-29
  write protecting, 2-31
Memory circuit/ I/O port test, 6-3
Menu (MENU key), 1-18
  description, A-5
Menu tree, A-4

N

Navaid selection, 3-33
Navigation data display (NAV DATA key), 2-45
  GPS information on, 4-5 - 4-7

P

Playback
  initial settings, 3-37
  memory card, 2-32
Plot interval selection by time, 2-33
PLOT INTVL key, 1-20, 2-33, 3-25
  customizing, 3-25
Program ROMs replacment, 6-12
Program version number display, 6-11

R

Range and bearing calculation
  by L/L coordinates, 3-17
  by the cursor, 3-17
  by waypoints, 3-18
Route, 3-2 - 3-8
  calculating distance and TTG, 3-19

cancelling route navigation, 3-8
creating by cursor, 3-4
creating by previously registered waypoint (1), 3-3
creating by previously registered waypoint (2), 3-4
creating through route list, 3-3
description, 3-2
following, 3-5
permanently deleting a route waypoint, 3-7
permanently deleting all route waypoints, 3-7
temporarily deselecting a route waypoint, 3-6

S

Satellite
forced health/deselection, 4-10
information and schedule display, 4-7
Save
data to memory card, 2-29
initial settings, 3-37
Scale keys, 1-11
Self test, 6-2 - 6-5
keyboard, 6-4
memory circuit/ I/O port, 6-3
self test at power on, 6-2
self test menu, 6-2
test pattern 1 (color dropout), 6-5
test pattern 2 self test (color distortion), 6-5
Shifting the display, 1-9
Ship's speed alarm, 2-23
Smoothing
description and setting, 3-32
GPS, 4-11
Specifications, A-2

T

Test pattern 1 self test (color dropout), 6-5
Test pattern 2 self test (color distortion), 6-5
Time and date setting, 2-3
Time mark, 1-28
Track
changing appearance of, 3-21
changing color, 2-4
deleting all, 3-11
deleting by box cursor, 3-23
deleting by color, 2-5
restarting track recording, 1-21
turning off recording of, 1-20
Trackball, 1-6
TRACK COLOR key, 2-4
Troubleshooting
error messages, 6-6 - 6-8
self test, 6-2 - 6-5
troubleshooting table, 6-14 - 6-16
True bearing, 2-37
Typographic conventions, 1-2

V

Video pilot display (VIDEO PILOT key)
no autopilot connection, 2-42
with autopillot connection, 5-4 - 5-6

W

Waypoints, 2-6 - 2-14
defined, 2-6 - 2-11
deleting by cursor, 2-14
deleting by waypoint list, 2-14
deleting external waypoint, 2-14
destination waypoint 2-15 - 2-18 (see *Destination waypoint*)
entering a comment, 2-11
entering by cursor, 2-8
entering by L/L coordinates, 2-7
entering by navigation aid, 2-10
entering by range and bearing, 2-10
entering by ship's position, 2-9
turning off by REGISTER WAYPOINT menu, 2-12
turning off by waypoint list, 2-12
turning on by REGISTER WAYPOINT menu, 2-13
turning on by waypoint list, 2-13

X

XTE (cross-track error alarm), 2-21